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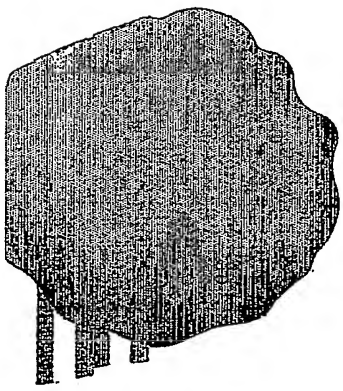

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(9) TITULO DE LA INVENCION

PROCEDIMIENTO, MAQUINA Y PACK PARA LA ELABORACION Y EXPEDICION DE BEBIDAS CALIENTES Y FRIAS.

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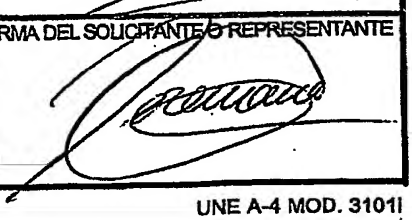
FIRMA DEL FUNCIONARIO

FIRMA DEL SOLICITANTE O REPRESENTANTE



(16) NOTIFICACION DE PAGO DE LA TASA DE CONCESION

Se le notifica que esta solicitud se considerará retirada si no procede al pago de la tasa de concesión; para el pago de esta tasa dispone de tres meses a contar desde la publicación del anuncio de la concesión en el BOPI, más los diez días que establece el art. 81 del R.D. 10-10-86.

1. O.E.P.M. Expediente

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PATENTE

RESUMEN Y GRAFICO

NUMERO DE SOLICITUD P20020 1558
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RESUMEN (Máx. 150 palabras)

PROCEDIMIENTO, MAQUINA Y PACK PARA LA ELABORACION Y EXPEDICION DE BEBIDAS CALIENTES Y FRIAS.

El procedimiento comprende: almacenar al menos una cápsula conteniendo una dosis del producto alimenticio a partir del cual se elabora la bebida caliente; transportar la cápsula, con unos medios de transporte a una estación de inyección de agua a presión; elaborar la bebida mediante la inyección de agua a presión a través de la cápsula; expulsar la cápsula de la estación de inyección de agua. Las cápsulas pueden contener líquidos y se almacenan packs, dispuestas ordenada y consecutivamente una detrás de otra en al menos una fila columna. De al menos un pack se extrae la primera cápsula, con unos medios dispensadores.
Se describe también la máquina para la elaboración y expedición de bebidas calientes, para la puesta en práctica del procedimiento a partir de cápsulas conteni-das en packs, que comprende múltiples depósitos de soporte, adaptados para alma-cenar packs de cápsulas de diferentes configuraciones y tamaños.

GRAFICO

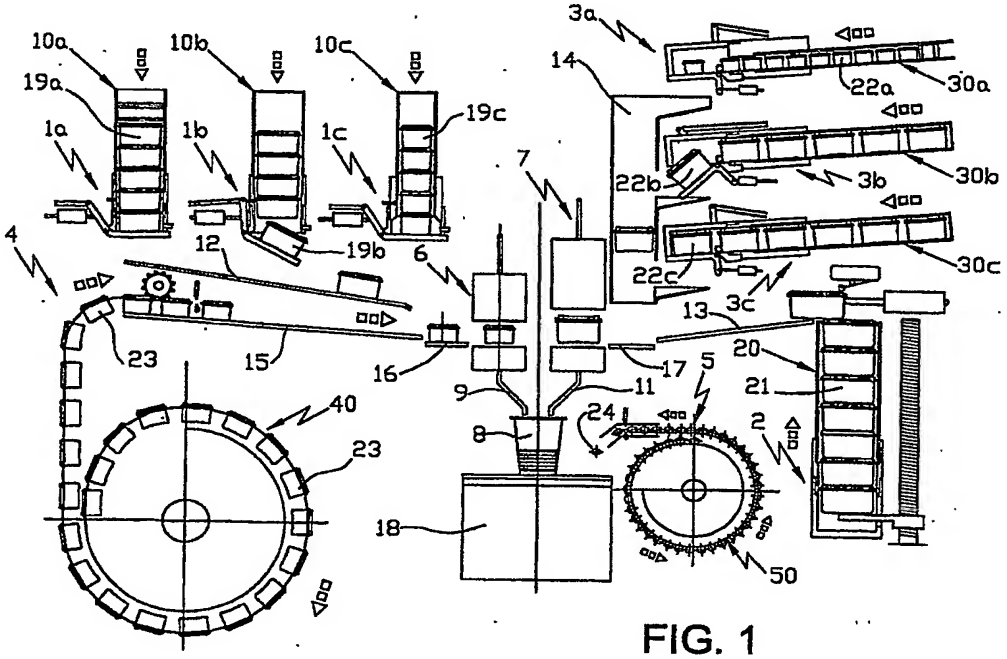

FIG. 1

OFICINA ESPAÑOLA DE PATENTES Y MARCAS

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PROCEDIMIENTO, MAQUINA Y PACK PARA LA ELABORACION Y EXPEDICION DE BEBIDAS CALIENTES Y FRIAS.

GRAFICO (SOLO PARA INTERPRETAR RESUMEN)

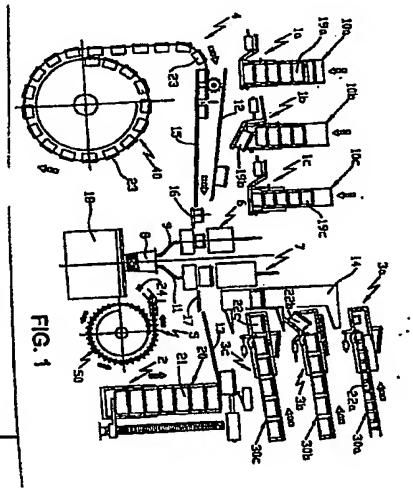


FIG. 1

(57) RESUMEN

PROCEDIMIENTO, MAQUINA Y PACK PARA LA ELABORACION Y EXPEDICION DE BEBIDAS CALIENTES Y FRIAS.

El procedimiento comprende: almacenar al menos una cápsula conteniendo una dosis del producto alimenticio a partir del cual se elabora la bebida caliente; transportar la cápsula, con unos medios de transporte a una estación de inyección de agua a presión; elaborar la bebida mediante la inyección de agua a presión a través de la cápsula; expulsar la cápsula de la estación de inyección de agua. Las cápsulas pueden contener líquidos y se almacenan packs, dispuestas ordenada y consecutivamente una detrás de otra en al menos una fila columna. De al menos un pack se extrae la primera cápsula, con unos medios dispensadores.
Se describe también la máquina para la elaboración y expedición de bebidas calientes, para la puesta en práctica del procedimiento a partir de cápsulas conteni-das en packs, que comprende múltiples depósitos de soporte, adaptados para alma-cenar packs de cápsulas de diferentes configuraciones y tamaños.

DESCRIPCION

PROCEDIMIENTO, MÁQUINA Y PACK PARA LA ELABORACIÓN Y EXPEDICIÓN DE BEBIDAS CALIENTES Y FRIAS

Sector de la Técnica

La presente invención se refiere a un procedimiento para elaborar y expedir de forma automática bebidas calientes y frías, tales como por ejemplo café expreso, café liofilizado, café descafeinado expreso, chocolate, té, té limón, manzanilla, poleo, otras infusiones, caldos, ..., a partir de cápsulas monodosis de producto en estado sólido. En un segundo y tercer aspectos, la invención se refiere a una máquina y a un pack de dosis para la puesta en práctica del procedimiento.

El procedimiento objeto de la invención permite, también, la elaboración y expedición automática de bebidas calientes o frías a partir de monodosis liquidas envasadas en recipientes unitarios, por ejemplo leche UHT, cacao, etc.

El procedimiento objeto de la invención permite la elaboración y expedición automática de bebidas calientes por un procedimiento combinado según el cual se elabora la bebida caliente a partir de una o más cápsulas monodosis de estado sólido, por ejemplo café con leche, a partir de una monodosis de café expreso y una monodosis de leche en polvo y también permite la elaboración y expedición automática de bebidas calientes por un procedimiento combinado según el cual se elabora la bebida caliente a partir de una monodosis de producto en estado sólido y una monodosis de producto en estado líquido, por ejemplo café expreso con leche líquida UHT

El procedimiento objeto de la invención es aplicable, con diversos grados de automatización y desarrollo, a máquinas para uso doméstico conocidas como "cafeteras domesticas", es aplicable a máquinas conocidas como "máquinas de café para oficinas" que se utilizan para dar servicio a colectivos con un reducido numero de personas, (oficinas, talleres, academias, etc.)., es aplicable a máquinas para hostelería y restauración conocidas como "máquinas de café profesionales" y también es aplica-

ble a máquinas autoservicio para grandes colectivos conocidas como "máquinas de vending".

Antecedentes de la invención

En el mercado existe una gran diversidad de máquinas elaboradoras/expendedoras de bebidas calientes, a todas ellas nos referiremos de ahora en adelante con la denominación genérica de *máquinas de café*

En general las máquinas de café elaboran café expreso y algunas de ellas elaboran otras bebidas calientes como por ejemplo café liofilizado, infusiones, té, caldos, café expreso con leche etc.
Entre las diversas bebidas calientes que pueden elaborar dichas máquinas de café la elaboración de café expreso con leche presenta el mayor grado de dificultad.

No se conocen sistemas automáticos para elaborar obtener café expreso con leche, de máxima calidad, que mantenga el aroma y sabor del café expreso desde el primer al último servicio y que utilizando leche líquida cumpla los requisitos sanitarios mas exigentes

A continuación describimos el procedimiento convencional para elaborar café expreso con leche.

Las máquinas de café con un mayor grado de automatización y con mayor número de funciones integradas ejecutan el proceso completo y las menos automáticas ejecutan solo una parte de dicho proceso, debiendo el usuario realizar de forma manual el resto de operaciones.

Las máquinas automáticas que elaboran café con leche expreso lo hacen a partir de leche en polvo siguiendo procesos no exentos de un cierto riesgo a nivel sanitario y no se conocen máquinas automáticas que elaboren café expreso con leche liquida.

El proceso convencional para la elaboración de café expreso con leche sigue las siguientes fases:

- moler café;
- dosificar la cantidad de café necesaria para un servicio;
- introducir la dosis de café molido en un receptáculo generalmente troncocónico cerrado lateralmente y parcialmente cerrado por sus bases superior e inferior con uno a más filtros que impiden la salida de partículas sólidas pero permiten el paso de líquidos;
- colocar el receptáculo en la boca del inyector de agua caliente de la máquina de café;
- cerrar a presión el receptáculo contenedor de café contra la boca del inyector de agua;
- inyectar agua caliente a presión a través del receptáculo que contiene el café;
- recoger el café expreso sobre un vaso o taza previamente situado debajo del inyector;
- dosificar la cantidad de leche en polvo adecuada para la elaboración de un café con leche;
- añadir una dosis de leche en polvo con agua caliente a una cazoleta con batidor, que seguirá el recorrido a través de un tubo de silicona hasta el café expreso y añadir agua caliente (si el café expreso con leche se elabora "manualmente" una vez obtenido el café expreso se le añade leche líquida, que al no ser caliente enfría ligeramente al café);
- añadir azúcar, (opcional);
- servir;
- retirar, con unos medios de expulsión, de la boca del inyector el receptáculo que contenía café molido y que después de la elaboración de café expreso contiene marro de café;
- extraer y desechar el marro del receptáculo;
- limpiar el receptáculo; y
- controlar y reponer existencias (solo en máquinas automáticas).

La calidad del café con leche elaborado a partir de producto a granel siguiendo el procedimiento convencional que hemos descrito depende de múltiples variables de difícil control tanto si la elaboración final se realiza en máquinas de uso domestico como si se realiza en máquinas automáticas como por ejemplo máquinas de vending.

Los factores que afectan a la calidad del café expreso con leche, tanto en lo que se refiere a su sabor y aroma como a sus características sanitarias podemos agruparlas en tres grandes grupos.

Con respecto a los factores de almacenaje, para preservar el aroma y frescor es necesario conservar el café hasta el momento de su elaboración, cerrado en un recipiente hermético preferentemente sin aire.

En las máquinas automáticas tipo vending este requisito no se cumple debido a que el café en grano se almacena en recipientes de hasta 5 kilos de capacidad que pueden estar durante semanas, hasta nueva reposición, prácticamente vacíos, es decir, con pocos gramos de café y varios litros de aire, con lo que se acelera la oxidación del café y se pierde aroma y frescor. En aplicaciones de uso domestico o de hostelería y restauración, la conservación depende de la experiencia y cuidado que dispense el usuario.

En cuanto a los factores de molido, dosificación y prensado, es de indicar que, para elaborar un café expreso de calidad deben respetarse los parámetros establecidos por el suministrador del producto en cuanto a molido dosificación y prensado.

En máquinas automáticas tipo vending, el molido, dosificación y prensado dependen de la puesta a punto de la máquina, variando con el tiempo en función del mantenimiento y desgaste de los mecanismos. Tales factores también son sensibles a las variaciones de temperatura y humedad ambientales. En aplicaciones de tipo doméstico o de hostelería y restauración, el molido, dosificación y prensado dependen de la experiencia y cuidado que dispense el usuario.

En lo tocante a los factores de higiene y limpieza, es de remarcar que los residuos de servicios anteriores pueden contaminar a un nuevo servicio.

En máquinas manuales la higiene y limpieza de la máquina depende la experiencia y cuidado que dispense el usuario.

En máquinas automáticas, en especial las de tipo vending, es difícil mantener la máquina en condiciones adecuadas de limpieza e higiene, ya que se acumulan residuos en lugares no accesibles de los mecanismos dosificadores en especial en los tornillos sinfín dosificadores de caldo, azúcar, y leche en polvo, y también en los tubos de silicona (normalmente de 20 a 30 centímetros de longitud) que conducen el producto elaborado hasta el vaso. Dichos residuos por proceder de alimentos perecederos, se deterioran con el tiempo y pueden llegar a causar molestias o problemas de tipo sanitario. La temperatura y humedad en el interior de las máquinas de vending es alta, debido a las características propias del servicio de dichas máquinas y es un factor de riesgo adicional que propicia que algún residuo se adhiera en alguna parte de su recorrido y se deteriore rápidamente, contaminando con mas severidad a los servicios posteriores.

Por la solicitud de patente EP 1 002 490 A1 se conoce una máquina para distribuir bebidas a partir de porciones monodosis en polvo almacenadas en el interior de la máquina.

Por la solicitud de patente EP 1 089 240 A2 se conoce una máquina de vending automática de bebidas con una pluralidad de almacenes de cápsulas, cada una de las cuales contiene un extracto de bebida en polvo y medios para transferir dichas cápsulas desde los almacenes de cápsulas a una posición donde se elabora la bebida.

Dichas solicitudes de patente aportan mejoras en cuanto a factores de higiene y limpieza, pero no en cuanto a conservación del aroma y frescura del producto, ya que, por tratarse de almacenes de cápsulas abiertos, no preservan la aroma y frescor del extracto en polvo almacenado en las cápsulas, las cuales no pueden ser herméticas, toda vez que el sistema convencional de inyección de agua caliente no es compatible con cápsulas herméticas. La máquina descrita en la solicitud de patente EP 1 002 490 A1 solo admite un tipo de cápsulas y, si bien el sistema descrito en la solicitud de patente EP 1 089 240 A2 admite que el contenido de las cápsulas sea diferente, no admite cápsulas de dimensiones ni formas diferentes. En ambos casos la carga de las cápsulas en los respectivos almacenes de hace una a una con el riesgo, en el caso del sistema descrito en la solicitud de patente EP 1 089 240 A2, de que se mezclen en un mismo almacén cápsulas con contenidos distintos.

Actualmente existen en el mercado diversos tipos de monodosis convencionales de formas y volúmenes diferentes adecuados en cada caso al producto que contienen según el diseño propio de cada fabricante. También existen en el mercado máquinas específicas para cada cápsula, pero ninguna de dichas máquinas conocidas puede procesar dos tipos de cápsulas diferentes ni ninguna cápsula puede ser procesada en dos tipos de máquina.

Las monodosis convencionales existentes en el mercado se pueden clasificar en tres grandes grupos:

- A) cápsulas monodosis de producto en estado sólido, no herméticas,
- B) cápsulas monodosis de producto en estado sólido, herméticas, y
- C) recipientes monodosis de producto en estado líquido.

Las bebidas a partir de cápsulas monodosis no herméticas de producto en estado sólido se elaboran en máquinas no automáticas adaptadas a las características de cada monodosis dotadas con inyectores de agua caliente convencionales para la elaboración de bebidas.

Las bebidas a partir de cápsulas monodosis herméticas de producto en estado sólido, se elaboran en máquinas no automáticas, adaptadas a las características de cada monodosis y dotadas de inyectores de agua caliente convencionales y elementos que rompen la hermeticidad de la cápsula antes de iniciar la inyección de agua caliente.

No se conocen máquinas automáticas para la elaboración de bebidas calientes a partir de monodosis de productos perecederos en estado líquido, por ejemplo, monodosis de leche UHT.

<u>Explicación de la invención</u>

La finalidad de la presente invención proporcionar un nuevo procedimiento automático para elaborar bebidas calientes; café expreso, café liofilizado, café descafeinado

expreso, chocolate, té, té limón, manzanilla, poleo, otras infusiones, caldos, etc., a partir de cápsulas monodosis de producto en estado sólido, que dé solución completa y simultánea a todos y cada uno de los problemas e inconvenientes citados de la técnica anterior.

En particular, un objetivo de la presente invención es proporcionar una máquina única para procesar diversos tipos de cápsulas.

A tal finalidad, según un primer aspecto de la presente invención, se proporciona un procedimiento para la elaboración y expedición de bebidas calientes con las características de la reivindicación 1.

En las reivindicaciones 2 a 9 se definen otras características del procedimiento según la invención.

Según un segundo aspecto de la invención, se da a conocer un pack de monodosis de producto alimenticio según las características de la reivindicación 10.

En las reivindicaciones 11 a 17 se definen realizaciones del pack de la presente invención.

Según un tercer aspecto de la invención, se proporciona una máquina para la elaboración y expedición de bebidas calientes, con las características de la reivindicación 18, para la puesta en práctica del procedimiento y a partir de los nuevos packs según la invención.

En las reivindicaciones 18 a 39 se definen otras características y modos de realización de la máquina según la presente invención.

Apreciará un experto en la técnica que la presente invención proporciona un procedimiento automático para elaborar y expedir bebidas calientes a partir de monodosis liquidas envasadas en recipientes unitarios, por ejemplo leche UHT, cacao, etc.

Una gran ventaja de que goza la presente invención es que permite, para con un único tipo de inyector, utilizar cápsulas de diferentes tamaños y formas, sin más que cambiar o ajustar las mordazas.

Además, en la máquina expendedora pueden situarse uno o más inyectores convencionales de agua caliente cada uno de ellos con bridas de sujeción con formas y características adecuados a cada una de las diversas medidas y características de los diferentes tipos de cápsulas almacenadas en la máquina.

Se apreciará pues, que la invención permite dispensar monodosis líquidas con o sin calentamiento previo en un vaso dispuesto al efecto que puede estar vacío o contener un servicio elaborado por la propia máquina por ejemplo un café expreso para elaborar en este caso un café expreso con leche. El orden de vertido de líquidos sobre el vaso destinado al consumo puede ser inverso, es decir, en el caso del ejemplo anterior verter primero la leche y luego el café expreso dentro del mismo vaso.

Breve descripción de los dibujos

Otras características y ventajas de la presente invención se describen a continuación, haciendo referencia a unas realizaciones preferidas de la misma, ilustradas a título de ejemplo no limitativo en los dibujos que se acompañan, en los que:

La Figura 1 es una vista esquemática en alzado de una máquina que incorpora el procedimiento y parte de los mecanismos de la invención.

La Figura 2 es una vista ampliada en alzado de un detalle de dicha máquina que corresponde a mecanismos dispensadores de salida axial inferior de cápsulas no herméticas almacenas en packs tubulares.

La Figura 3 es una vista ampliada en alzado de un detalle de dicha máquina que corresponde a un mecanismo dispensador de salida axial superior de cápsulas herméticas almacenadas coaxialmente en un pack tubular.

La figura 4 es una vista en planta de un detalle, según VI-VI, de la Figura 3

La Figura 5 es una vista ampliada en alzado de un detalle de dicha máquina que corresponde a mecanismos dispensadores de salida inferior de cápsulas no herméticas almacenas linealmente en packs tubulares.

La Figura 6 es una vista ampliada en alzado de un detalle de dicha máquina que corresponde a un mecanismo dispensador de cápsulas herméticas almacenadas en un pack configurado en forma de cinta continua enrollada en forma de espiral.

La Figura 7 corresponde a vista en planta de un detalle de la Figura 6

La Figura 8 es una vista en alzado que corresponde a un pack de cápsulas herméticas en forma de cinta continua.

La Figura 9 representa en alzado el esquema de funcionamiento de un mecanismo dispensador de bebida caliente a partir de monodosis líquidas y también el esquema de funcionamiento del mecanismo dispensador de azúcar y cucharillas.

En la Figura 10 corresponde a una vista en alzado de un inyector de agua caliente a presión de mordazas intercambiables

La Figura 11 representa una secuencia de elaboración de bebida inyectando agua caliente en un tipo de cápsula monodosis hermética realizada por un inyector de mordazas cambiables. En dicha Figura también se representa la elaboración y expedición de una bebida a partir de una monodosis de producto en estado líquido.

La Figura 12 representa una secuencia de inyección de agua caliente en otro tipo de cápsula monodosis hermética realizada por un inyector de mordazas cambiables

Descripción detallada de la invención

Haciendo referencia a la Figura 1, las referencia numérica 1a, 1b, 1c designan a sendos conjuntos de mecanismos dispensadores de cápsulas no herméticas de sali-

da axial inferior, en cada uno de dichos dispensadores están insertados packs tubulares axiales 10a,10b,10c que almacenan cápsulas 19a,19b,19c.

La referencia numérica 2 designa mecanismo dispensador de cápsulas herméticas de salida axial superior, en dicho dispensador está insertado un pack tubular axial 20 que almacena cápsulas 21.

Las referencia 3a, 3b, 3c designan sendos mecanismos dispensadores de cápsulas no herméticas de salida inferior en cada uno de dichos dispensadores están insertados packs tubulares lineales 30a, 30b, 30c que almacenan cápsulas 22a, 22b, 22c; 4 designa un mecanismo dispensador de cápsulas herméticas almacenadas en un pack de cápsulas herméticas configurado en forma de cinta continua 40, enrollada en espiral, que almacena cápsulas 23; 5 es un conjunto dispensador de azúcar y cucharillas, almacenadas en un pack en forma de cinta continua 50, enrollada en espiral, que almacena servicios de azúcar y cucharillas 24; 6 designa un primer inyector de agua caliente a presión; 7 designa un segundo inyector de agua caliente a presión; 8 es un vaso que recoge indistintamente la bebida caliente dispensada por dichos inyectores. Las referencias 9 y 11 designan tubos que conducen la bebida desde la salida de los correspondientes inyectores al vaso 8; 12 es un plano inclinado que recibe y traslada las cápsulas dispensadas por los mecanismos 1a, 1b y 1c; 13 es un plano inclinado que recibe y traslada las cápsulas dispensadas por el mecanismo 2.

La referencia numérica 14 designa a una conducción para las cápsulas dispensadas por los mecanismos 3a, 3b, 3c, 15 es un plano inclinado que recibe y traslada las cápsulas dispensadas por el mecanismo 4; la referencia numérica 16 designa un alojamiento donde se recogen las cápsulas que deslizan indistintamente por los planos inclinados 12 y 15; la referencia numérica 17 es un alojamiento donde se recogen las cápsulas que deslizan por el plano inclinado13 y/o circulan a través de la conducción 14; y 18 es una base que sostiene el vaso 8.

En la Figura 2, cada uno de los conjuntos dispensadores 1a, 1b, 1c, comprende un cuerpo de dispensador 25 de forma cilíndrica abierto por sus dos bases, la inferior se cierra con una tapa 26 que presenta una prolongación 27, dicha tapa bascula sobre un eje 28. Un electroimán 29 actúa sobre la prolongación 27 para forzar la abertura

de dicha tapa 26 venciendo la fuerza de un muelle antagonista 31. Cuando el imán está desactivado la fuerza del muelle 31 mantiene la tapa cerrada contra base inferior del cuerpo del dispensador produciéndose un cierre hermético entre dicha tapa y una junta tórica 32 que circunda la abertura situada en la base del dispensador.

La abertura superior de dicho cuerpo del dispensador 25 presenta un perfil adecuado para alojar herméticamente adaptadores 33 de forma tubular con sus dos bases abiertas. En la figura se han representado dos tipos de adaptadores el adaptador 33a situado en los dispensadores 1a y 1b y el adaptador 33c situado en el dispensador 10c. La abertura superior de cada uno de dichos adaptadores tiene un perfil y unas dimensiones adecuadas para alojar herméticamente packs de cápsulas. Sobre un mismo dispensador 1 de cápsulas es posible alimentar sucesivamente packs de dimensiones y formas diferentes, por ejemplo 10a, 10c, cambiando en cada caso el adaptador 33, por ejemplo 33a, 33c, por lo que en un mismo tipo de dispensador se pueden dispensar cápsulas de formas y dimensiones distintas, por ejemplo cápsulas 19a, 19c.

Los packs 10a, 10b, 10c comprenden respectivamente tubos 34, 35,36 en cuyo interior se sitúan respectivamente cápsulas 19a, 19b, 19c de formas dimensiones y contenidos que pueden ser distintos. Dichos packs antes de insertarse en el correspondiente adaptador del respectivo dispensador están cerrados herméticamente y pueden contener un gas inerte, preferiblemente menos pesado que el aire, para preservar el aroma y sabor de las monodosis de producto en estado sólido. Los packs tienen la base la base inferior cerrada con por una tapa removible por ejemplo de papel, plástico, aluminio etc. y pueden tener la tapa superior también removible. Los packs 10b y 10c tienen solo la tapa superior removible y el pack 10a tiene también la tapa superior removible.

Las operaciones que debe realizar un operador para colocar un pack en el correspondiente dispensador son las siguientes:

- retirar el pack anterior;
- retirar el adaptador 33 caso que el nuevo pack sea de dimensiones diferentes al anterior;

- colocar un nuevo adaptador adecuado a las características geométricas del nuevo pack;
- eliminar la tapa inferior del pack, por ejemplo de papel, que cierra herméticamente el nuevo pack;
- colocar el nuevo pack en el correspondiente adaptador; y
- en el caso de packs con tapa superior removible, retirar también la tapa superior, y colocar en interior del pack el conjunto pistón 37.

El conjunto pistón 37 comprende un cuerpo pistón 38 y unas juntas tóricas 39. El conjunto pistón encaja hermética y deslizantemente con el interior del tubo 34. El peso del conjunto pistón 37 colabora con su peso a que las cápsulas deslicen hacia la salida del dispensador. El cuerpo pistón puede ser de material ferromagnético en cuyo caso un detector ferromagnético 41 situado en la base del cuerpo del dispensador 33a detecta cuando el pistón llega a la posición mas baja y emite una señal al procesador central de la máquina, no representado, indicando que han sido dispensadas todas las cápsulas del pack.

Cuando el electroimán 29 actúa sobre la prolongación 27 de la tapa 26 venciendo la fuerza del muelle antagonista 31 se abre la tapa inferior 26 del dosificador y la cápsula situada en la posición inferior es dispensada sobre un plano inclinado 12 que la conduce hacia un alojamiento 16. Dicho plano inclinado 12 puede ventajosamente ser substituido por un medio mecánico de desplazamiento, por ejemplo una cinta transportadora.

Cada uno de los adaptadores 33 dispone de un mecanismo retenedor de cápsulas que comprende, por ejemplo un eje 42 y un muelle antagonista 43.

Durante la apertura de la tapa 26, la prolongación 27 actúa sobre el eje 42 venciendo la fuerza de un muelle antagonista 43 haciendo que dicho eje avance hasta una posición adecuada para retener la cápsula situada inmediatamente encima de la cápsula situada en la posición más baja, que es la que se dispensa en cada caso.

En las Figura 3 y 4 se representa un mecanismo dispensador de salida axial superior 2 de cápsulas herméticas 21 almacenadas coaxialmente en un pack tubular 20. El

mecanismo dispensador comprende una base 44 de forma tubular con la base inferior cerrada y la base superior abierta. La abertura de la base superior está configurada para alojar un adaptador 45, dicho adaptador es de configuración substancialmente cilíndrica y está abierto por ambas bases, estando la abertura superior de dicho adaptador 45 configurada de forma adecuada para alojar interiormente el perfil exterior de packs 20. Sobre un mismo dispensador de cápsulas 2 es posible alimentar sucesivamente packs de dimensiones y formas diferentes, cambiando en cada caso el adaptador 45.

Las paredes tubulares de la base 44, del adaptador 45 y del pack 20 están abiertas a lo largo de toda su longitud a través de una regata longitudinal 47 paralela a sus respectivos ejes longitudinales. En el montaje de dicho adaptador 45 sobre dicha base 44 y de dicho pack 20 sobre dicho adaptador 45 unos posicionadores geométricos convencionales no representados fijan la posición radial de dichos elementos para lograr la alineación de dichas regatas.

Por el interior de dichos elementos 44, 45 y 20 desliza coaxialmente un empujador 46. El cuerpo 48 del empujador 46 atraviesa la regata 47 y a través de un mecanismo de deslizamiento, por ejemplo tuerca/tornillo 49, 51, accionado por un sistema convencional no representado, empuja hacia arriba las cápsulas 21 del pack 20 que se apoyan sobre dicho empujador.

El funcionamiento de conjunto dispensador 2 es como sigue. El operador inserta sobre la base 44 un adaptador 45 de medidas adecuadas al pack 20 que inserta a continuación, los posicionadores geométricos obligan a que el montaje se ejecute de forma que las regatas 27 queden alineadas. Previamente el sistema de control de la máquina ha posicionado el empujador 46 en la posición inferior de su recorrido con lo que las cápsulas 21 quedan apoyadas sobre el empujador. En el momento en que un usuario ordena un servicio de bebida calienta que se deba elaborar a partir de una cápsula de dicho pack el sistema de accionamiento del mecanismo tuerca / tornillo, no representado, se activa haciendo que el empujador ascienda hasta que la cápsula 21a que ocupa la posición superior en el pack acciona un microrruptor 52 situado encima del pack y desactiva el movimiento del mecanismo tuerca / tornillo, cuando la cápsula 21a axialmente ha sido totalmente extraída del pack. A continuación un elec-

cápsula, La cápsula seleccionada pasa sucesivamente por las posiciones 23a, 23b, 23c, 23d, 23e, 23f. En la posición 23c la cápsula se inserta en el inyector 6 y en la posición 23f la cápsula ya utilizada se evacua a un depósito 58 que recibe las cápsulas utilizadas. El desplazamiento y traslado de la cápsula puede realizarse con la ayuda de planos inclinado o preferentemente conduciéndola sobre cintas transportadoras, la inserción y evacuación de la cápsula en el inyector puede realizarse por medios mecánicos electromagnéticos neumáticos, etc.

En la Figura 8 se ha representado un pack en cinta continua 4 de cápsulas herméticas, con cápsulas herméticas 23 insertadas a intervalos regulares en una cinta continua 40, susceptible de enrollarse a modo de una bobiba, que presenta a intervalos agujeros de arrastre 55. dichas cápsulas herméticas 23 se componen de recipientes 59, preferentemente cilíndricos o troncocónicos que tienen la base superior abierta con una valona discoidal que se proyecta hacia el exterior 65 una pared lateral 67 y un fondo 64. El fondo 64 presenta zonas debilitadas para facilitar su rasgado y/o abertura. La pared lateral 67 presenta un resalte interior apto para alojar un filtro superior 60 de forma discoidal que encaja con la pared interior del recipiente.

El filtro superior 60 presenta una valona discoidal hacia el exterior 66 que se proyecta por encima de la parte superior del recipiente 59 y que presenta un diámetro exterior sensiblemente igual al de la valona 65, la cara superior de dicha valona discoidal 66 de dicho filtro superior 60 presenta una cara superior plana configurada de forma que crea una junta hermética cuando se aplica con presión contra la superficie plana antagonista de un inyector de agua caliente.

En el interior de dichos recipientes 59 y próximo al fondo 64 se encuentra un filtro inferior 61. La monodosis de producto sólido se aloja en el espacio definido en el interior del recipiente 59 comprendido entre los dos filtros 60,61 y la pared lateral 67.

Un precinto 62 con una zona central debilitada para facilitar su rasgado y/o abertura se aloja interiormente en la parte superior del filtro superior 60, creando un espacio entre dicho filtro y dicha tapa. La parte superior de dicha tapa no sobresale por encima de la parte superior la cara superior de dicha valona discoidal 66 del filtro superior 60. Entre la parte inferior del anillo discoidal 66 y la parte superior de la valona 65 se

dispensa las dosis de azúcar depositándolas sobre la base 18. Sobre dicha base 18 se apoya el vaso 8 para recibir el suministro de bebida caliente y se dispensa la monodosis de bebida líquida, por ejemplo leche UHT, con o sin calentamiento, y se dispensa también las dosis de azúcar, ventajosamente en el mismo envoltorio que envuelve la dosis de azúcar para un servicio puede ir envuelta también una cucharilla.

En las Figura 10, 11 y 12 se ha representado un inyector 80 de agua caliente de mordazas cambiables que presenta un cuerpo superior fijo 68 y un cuerpo inferior fijo 69 con una salida para líquidos 70. Respectivamente montados en dichos cuerpos superior e inferior 68,69 se encuentran montadas una mordaza superior cambiable 71a, 71b y una mordaza inferior cambiable 72a, 72b. La mordaza superior cambiable 71 comprende un cuerpo de mordaza superior 78 unida desmontablemente al cuerpo superior del inyector 68 que de forma estanca conduce la inyección de agua a presión que de forma convencional inyecta dicho cuerpo superior hasta la salida inferior 75 a de dicha mordaza superior cambiable. La salida inferior 75 forma parte de un pistón 73a que desliza axial y herméticamente en el interior de dicha mordaza 71 a. Dicho pistón 73a presenta una valona inferior 74 con una superficie inferior plana configurada para formar una junta estanca con una superficie relacionada de una cápsula monodosis.

Cuando se ordena la inyección de agua caliente, el pistón 73a desliza axial y herméticamente hacia abajo impulsado por un sistema mecánico, mecánico elástico, neumático o hidráulico hasta que la superficie 74 establece contacto con la cápsula, el contacto con dicha cápsula impide que el pistón continúe descendiendo, el pistón se detiene aplicando una presión a través de su superficie 74 contra la parte correspondiente de la cápsula creando una junta hermética.

La mordaza inferior 72a se compone de un cuerpo 81 con una superficie 76 sobre la que se apoya la cápsula, y una aguja cilíndrica hueca 82 configurada para rasgar o perforar la parte inferior de la cápsula. Dicha aguja puede sobresalir por encima de dicha superficie 76 o ventajosamente estar unida elásticamente al cuerpo 81 de forma que cuando esté recibe la presión que le transmite la cápsula que a su vez recibe a través del movimiento del pistón 73a la aguja 82 sobresale por encima de dicha

superficie 76 y rasga o perfora la superficie inferior de dicha cápsula, retornando a su posición de reposo cuando el pistón 73a deja de transmitir presión.

En la Figura 11 se ha representado una secuencia A1-A4 en que el inyector 80 inyecta agua caliente a presión a una cápsula 23. En A-1 se representa la posición inicial de la cápsula 23 situada en el inyector. En el inyector están montadas la mordaza superior 71a y la mordaza inferior 72a. En la posición A-2 el pistón 73a ha descendido, la superficie 74 ha entrado en contacto con la superficie 66 de la cápsula creando una junta hermética, la salida 75 a ha perforado/rasgado la superficie 63 de la cápsula y la aguja 82 que sobresale por encima de la superficie 76 ha perforado / rasgado la superficie 64 de la cápsula. Una vez alcanzada dicha posición se inyecta agua caliente a presión para elaborar la bebida caliente a partir de la monodosis de producto en estado sólido contenido en la cápsula, dicha agua entra en la cápsula a través de la salida 75a atravesando el filtro superior y sale por la superficie peforada/rasgada 64 de la cápsula después de haber atravesado el filtro inferior y haber elaborado la bebida caliente, la junta hermética creada entre las superficies 74 y 66 obliga a toda el agua inyectada a circular a través de la cápsula para la elaboración de la bebida caliente.

La posición A-3 es análoga a la posición A-1, cuando se llega a esta posición ya se ha elaborado la bebida caliente. En esta posición la cápsula presenta sus superficies 63 y 64 abiertas/rasgadas.

En la posición A-4 el inyector permanece en la misma posición y la cápsula 23 ha sido retirada del inyector y evacuada, a través de un sistema automático a un depósito de cápsulas utilizadas no representado.

En el caso que la cápsula fuera de características no herméticas, en la fase A-2, no hubiese sido necesario producir la abertura/rasgado de las superficies superior e inferior de la cápsula, el resto del procedimiento hubiese sido idéntico.

En el caso de que el contenido de la cápsula fuese una monodosis líquida el proceso sería el mismo que se ha descrito pero sin inyectar agua. En la posición A2 se efectúa el rasgado / abertura las superficies 63,64 pero no se inyecta agua caliente, En la

- Ventajosamente al realizar la reposición de existencias el reponedor mediante un lector de código de barras portátil o asociado a la máquina, realiza una lectura del código de barras de los packs que extrae y de los packs que coloca, y el procesador central recibe informaciones a través de lectura, detección o teclado de en que dispensadores se han montado los packs. Con lo que el procesador central conoce el stock disponible y la ubicación del stock.

II. Procedimiento de expedición de bebidas con una máquina objeto de la presente invención.

- El usuario elige la bebida – (Para efectuar la selección el usuario disfruta de la ventaja de poder ver que monodosis, tipo y marca, están disponibles en la máquina).
- En caso de que la bebida solicitada no esté disponible el procesador central convencional de la máquina da una señal de aviso de producto no disponible. (La máquina está dotada de sistemas de contaje y control que permiten conocer si la máquina dispone de existencias para elaborar la bebida solicitada).
- El usuario efectúa el prepago de forma convencional.
- La máquina dispensa convencionalmente un vaso.
- Si la bebida solicitada debe elaborarse a partir de una monodosis almacenada en un dispensador 1 el procesador central de la máquina activa el electroimán 29, que abre la puerta 26, y dispensa una cápsula sobre el plano inclinado 12 que la conduce hasta el alojamiento 16, dicho plano inclinado puede ventajosamente ser substituido por una cinta móvil u otro sistema de transporte.

- Si la máquina dispone de más de un inyector convencional 6,7 un mecanismo automático de inserción inserta la cápsula selectivamente en el inyector correspondiente, se inyecta agua de forma convencional y se expende la bebida. A continuación un mecanismo convencional extrae la cápsula utilizada y la deposita en un depósito de cápsulas. Si el cliente ha solicitado una bebida que para su elaboración requiere dos monodosis de producto, por ejemplo, café expreso con leche a partir de leche en polvo, primero se elabora una de ellas, por ejemplo, el café expreso y a continuación se inyecta agua a la monodosis de leche en polvo para elaborar el café expreso con leche.
- Si la máquina dispone de un inyector 80 de mordazas cambiables previo a la inserción de la cápsula en el inyector el procesador central en función de los datos que la aporten los lectores de código de barras situados en 16, 17 sobre las características de la cápsula efectuará el cambio de las mordazas que corresponda siguiendo a continuación el proceso como en el caso anterior.
- Si la bebida solicitada debe servirse entregando un envase monodosis 86 de líquido caliente y sin abrir el mecanismo convencional de dispensación hace avanzar una monodosis hasta situarla en el interior del horno microondas 87, a continuación se cierran las puertas 88 del horno microondas 87 y se realiza el calentamiento, a continuación se abre el microondas y la cápsula sigue desplazándose hasta que es depositada en la plataforma 18 a disposición del usuario.
- S Si la bebida solicitada debe servirse vertiendo el contenido de una monodosis líquida 89 en un vaso 8, la cápsula una vez dispensada desde el pack que la contiene, por ejemplo por el mecanismo dispensador 2, se inserta en el inyector 80, que informado de las características de la cápsula por la lectura de su código de barras, la abrirá / rasgara por sus superficies superior e inferior sin inyectar agua permitiendo la entrada de aire que facilita la salida de líquido y su vertido en el vaso 8.

- Si al solicitar la bebida el usuario a solicitado también un servicio de azúcar/cucharilla el mecanismo dispensador de azúcar cucharilla 5 de forma análoga al mecanismo dispensador 4, dispensa una dosis de azúcar / cucharilla. En este caso la dosis de azúcar / cucharilla se dispensa directamente sobre la plataforma 18.

Entenderán los expertos en la técnica que con los packs, la máquina y los procedimientos objeto de la presente invención se logran alcanzar todos los objetivos de la presente invención.

La invención no debe considerarse limitada a los detalles descritos y en su realización podrán realizarse cuantas modificaciones y variaciones sean precisas, sin salir del alcance de la misma, que se define en las reivindicaciones adjuntas.

Todas las características técnicas mencionadas en las reivindicaciones están seguidas de signos de referencia que se incluyen con el exclusivo propósito de facilitar su comprensión y sin que tengan ningún efecto limitativo sobre el alcance de las mismas.

REIVINDICACIONES

1.- Procedimiento para la elaboración y expedición de bebidas calientes, en una máquina de elaboración y expedición, comprendiendo el procedimiento los pasos de:

almacenar en unos medios de almacenamiento al menos una cápsula (5, 19, 19a, 19b, 19c, 21, 21a, 22a, 22b, 22c, 23, 23a, 23b, 23c, 23d, 23e, 23f, 79) conteniendo una dosis del producto sólido a partir del cual se elabora la bebida caliente;

transportar la cápsula, con unos medios de transporte a una estación de inyección de agua a presión (6, 7, 68, 80);

elaborar la bebida mediante la inyección de agua a presión a través de la cápsula; y

expulsar la cápsula de la estación de inyección de agua,

caracterizado porque comprende además las etapas de:

almacenar las cápsulas, en dichos medios de almacenamiento, en al menos un pack (10, 10a, 10b, 10c, 20, 30, 30a, 30b, 30c, 40, 40a, 40b, 40c) de cápsulas monodosis en la que éstas están dispuestas ordenada y consecutivamente una detrás de otra en al menos una fila columna; y

extraer, antes de la etapa de transportar, de al menos un pack, la primera cápsula, con unos medios dispensadores (1, 1a, 1b, 1c, 2, 3, 3a, 3b, 3c, 4).

2.- Procedimiento según la reivindicación 1, caracterizado porque en la máquina se almacenan simultáneamente al menos dos packs de cápsulas monodosis del mismo producto alimenticio.

3.- Procedimiento según la reivindicación 1, caracterizado porque en la máquina se almacenan simultáneamente al menos dos packs de cápsulas monodosis de distinto tamaño y dimensiones y para productos diferentes.

4.- Procedimiento según una cualquiera de las reivindicaciones anteriores, caracterizado porque las cápsulas monodosis de al menos uno de los packs contiene productos sólidos.

5.- Procedimiento según una cualquiera de las reivindicaciones anteriores,

caracterizado porque caracterizado porque las cápsulas monodosis de al menos uno de los packs contiene un producto líquido.

6.- Procedimiento según una cualquiera de las reivindicaciones anteriores, caracterizado porque comprende los pasos de:

seleccionar, en unos medios de interfaz con el usuario, la bebida a elaborar y expedir;

determinar, mediante unos medios de control, el pack o packs (10, 10a, 10b, 10c, 20, 30, 30a, 30b, 30c, 40, 40a, 40b, 40c) almacenados en los medios de almacenamiento de la máquina, que contienen las cápsulas (5, 19, 19a, 19b, 19c, 21, 21a, 22a, 22b, 22c, 23, 23a, 23b, 23c, 23d, 23e, 23f, 79) que intervienen para la elaboración de la bebida seleccionada; y

discernir, mediante dichos medios de control, si tales packs determinados contienen al menos una cápsula;

7.- Procedimiento según la reivindicación 6, en el que, si se ha discernido negativamente, los medios de control dan una señal a los medios de interfaz de dar a visualizar la información de que la bebida seleccionada no puede ser elaborada.

8.- Procedimiento según la reivindicación 6, caracterizado porque, si se ha discernido positivamente, los medios de control dan una señal que habilitan las etapas y los pasos para elaborar y expedir la bebida seleccionada por el usuario.

9.- Procedimiento según una cualquiera de las reivindicaciones anteriores, caracterizada porque comprende, antes del paso de transportar la cápsula, la etapa de romper un precinto (62, 64) de hermeticidad de que eventualmente esté dotada la cápsula (21, 21a, 23) a transportar.

10. Pack (10, 10a, 10b, 10c, 20, 30, 30a, 30b, 30c, 40, 40a, 40b, 40c) de cápsulas monodosis de productos alimenticios para la elaboración y expedición de bebidas calientes, según el procedimiento de las reivindicaciones 1 a 9, del tipo de cápsulas dotadas de una forma aproximadamente prismática o cilíndrica, de caras laterales (67) cerradas y provistas de medios (66, 61) adaptados para permitir el paso a través de la cápsula de líquidos e impedir el paso de sólidos, caracterizado porque contiene una pluralidad de cápsulas (5, 19, 19a, 19b, 19c, 21, 21a, 22a, 22b,

contiene una pluralidad de cápsulas (5, 19, 19a, 19b, 19c, 21, 21a, 22a, 22b, 22c, 23, 23a, 23b, 23c, 23d, 23e, 23f, 79) dispuestas contigua y consecutivamente en al menos una fila o columna, y comprende unos medios de precinto hermético (62, 64) y de garantía de no violación del conjunto del pack, adaptados para ser fácilmente rotos a voluntad.

11.- Pack según la reivindicación 10, caracterizado porque las cápsulas están dispuestas en una columna de cápsulas alineadas coaxialmente,.

12.- Pack según la reivindicación 10, caracterizado porque las cápsulas están dispuestas en una fila de cápsulas alineadas colateralmente.

13.- Pack según la reivindicación 12, caracterizado porque las cápsulas están soportadas sobre una cinta continua (40), susceptible de ser arrollada en la forma de una bobina.

14.- Pack según una de las reivindicaciones 10 a 13, caracterizado porque cada una de las cápsulas comprende unos medios de precinto (62, 64) individuales, para el cierre hermético de las mismas, estando el precinto adaptado para su rotura por efecto de la presión del agua inyectada .

15.- Pack según la reivindicación 14, caracterizado porque las cápsulas 32 contienen un producto líquido.

16.- Pack según la reivindicación 15, caracterizado porque dicho producto líquido es leche UHT.

17.- Pack según una de las reivindicaciones 10 a 16, caracterizado porque contiene encerrado un gas inerte, menos denso que el aire

18.- Máquina para la elaboración y expedición de bebidas calientes, para la puesta en práctica del procedimiento según una cualquiera de las reivindicaciones 1 a 9, particularmente a partir de cápsulas (5, 19, 19a, 19b, 19c, 21, 21a, 22a, 22b, 22c, 23, 23a, 23b, 23c, 23d, 23e, 23f, 79) contenidas en packs (10, 10a, 10b, 10c, 20,

30, 30a, 30b, 30c, 40, 40a, 40b, 40c) según las reivindicaciones 10 a 17, que comprende unos medios de almacenamiento de cápsulas contenedoras de una dosis del producto sólido a partir del cual se elabora la bebida caliente; unos medios de transporte (12, 13, 14, 15, 16, 17) para mover las cápsulas a una estación de inyección (6, 7, 68, 80) de agua a presión; unos medios de inyección de agua caliente a presión a través de la cápsula; y unos medios de expulsión de la cápsula usada de la estación de inyección de agua, caracterizada porque dichos medios de almacenamiento comprenden al menos un depósito de soporte (25, 125) adaptado para almacenar packs de cápsulas de diferentes configuraciones y tamaños; y unos medios dispensadores (26, 126) de la primera cápsula.

19.- Máquina según la reivindicación 18, caracterizada porque comprende por lo menos dos depósitos de soporte para packs de cápsulas monodosis del mismo producto alimenticio.

20- Máquina según la reivindicación 18, caracterizada porque comprende por lo menos dos depósitos de soporte (25, 125) para packs de cápsulas monodosis de distinto tamaño y dimensiones y para diferentes productos.

21.- Máquina según una cualquiera de las reivindicaciones 18 a 20, caracterizada porque las cápsulas monodosis de al menos uno de los packs contiene productos sólidos.

22- Máquina según una cualquiera de las reivindicaciones 18 a 21, caracterizada porque las cápsulas monodosis de al menos uno de los packs contiene un producto líquido.

23.- Máquina según una cualquiera de las reivindicaciones 18 a 22, caracterizada porque comprende unos medios de rotura (75a, 82) del precinto (62, 64) de hermeticidad de que eventualmente esté dotada la cápsula a transportar.

24.- Máquina según la reivindicación 22 y 23, caracterizada porque los medios de rotura (75a, 82) están adaptados para perforar el precinto de hermeticidad de la

dichos cuerpos superior e inferior, respectivamente, una mordaza superior cambiable (71a, 71b) y una mordaza inferior cambiable (72a, 72b), comprendiendo la mordaza superior cambiable un cuerpo de mordaza superior (78), unida desmontablemente al cuerpo superior del inyector, que de forma estanca conduce la inyección de agua a presión que inyecta dicho cuerpo superior hasta la salida inferior (75) a de dicha mordaza superior cambiable, y estando la salida inferior dispuesta en un pistón (73ª) que desliza axial y herméticamente en el interior de dicha mordaza (71a) y que presenta una valona inferior (74) con una superficie inferior plana configurada para formar una junta estanca con una superficie relacionada de una cápsula monodosis.

31.- Máquina según una cualquiera de las reivindicaciones 18 a 30, caracterizada porque comprende unos medios de interfaz con el usuario, adaptados para seleccionar la bebida a elaborar y expedir; unos medios de control, adaptados para determinar el pack o packs almacenados en los depósitos de soporte, que contienen la cápsula o cápsulas que intervienen para la elaboración de la bebida seleccionada, para discernir si tales packs determinados contienen al menos una cápsula, y para dar una señal a los medios de interfaz de dar a visualizar la información de que la bebida seleccionada no puede ser elaborada o para dar una señal que habilita las etapas y los pasos para elaborar y expedir la bebida seleccionada por el usuario.

32. Máquina según la reivindicación 31, caracterizada porque comprende unos medios para leer códigos grabados sobre los packs que contienen las cápsulas que indican, por ejemplo, fecha de caducidad, presión de inyección de agua, volumen de agua a inyectar, características geométricas de la cápsula y número de cápsulas que contiene el pack.

33.- Máquina según la reivindicación 32, caracterizada porque los medios de control están adaptados para controlar la correcta inserción de la cápsula en el inyector que le corresponde según los códigos grabados, y para dosificar la cantidad de agua a inyectar en función de las características de la cápsula.

34.- Máquina según la reivindicación 31 ó 32, caracterizada porque los medios de control están adaptados para rehusar las cápsulas caducadas.

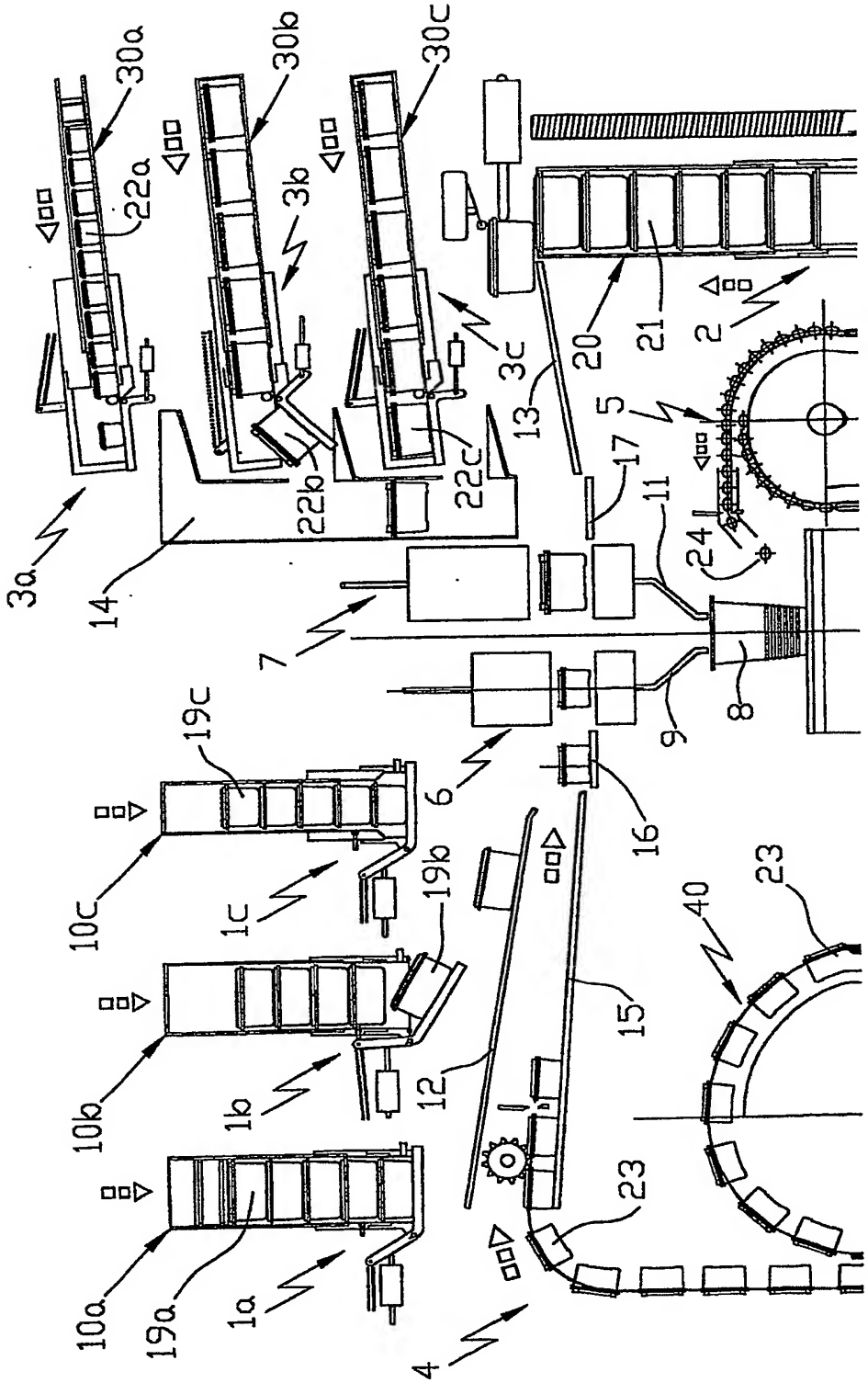
35.- Máquina según la reivindicación 31 ó 32, caracterizada porque los medios de control comprenden unos medios para evitar que se inserte erróneamente una cápsula en un inyector inadecuado en función de las características geométricas y de los requisitos de presión y volumen de inyección de agua.

36.- Máquina según una cualquiera de las reivindicaciones 18 a 35, caracterizada porque los diferentes elementos de la máquina están cubiertos por tapas transparentes, que permiten al usuario ver el tipo de producto almacenado en la máquina antes de solicitar el servicio y apreciar las condiciones de limpieza e higiene de la máquina.

37.- Máquina según una cualquiera de las reivindicaciones 18 a 36, caracterizada porque los medios de almacenamiento comprenden medios para almacenar una pluralidad de envases monodosis (86) de bebida líquida; medios para seleccionar y calentar un envase monodosis, y para trasladar dicho envase desde una posición (86a) de los medios de almacenamiento, hasta una posición (86e) adyacente a los medios de inyección y expulsión.

38.- Máquina según la reivindicación 37, caracterizada porque comprende unos medios de calentamiento de los envases monodosis (86).

39.- Máquina según la reivindicación 38, caracterizada porque dichos medios de calentamiento comprenden un microondas (87), dotado de puertas de entrada (88a) y salida (88b), adaptadas para abrirse para permitir la entrada y salida del envase (86, 86c), y permanecen cerradas durante el calentamiento de la misma.


30a
30b
30c
22a
3b
3c
20
21
2
13
5
17
11
24
22b
22c
3a
14
7
6
16
9
8
19c
10c
1c
19b
10b
1b
12
15
40
23
10a
19a
1a
4

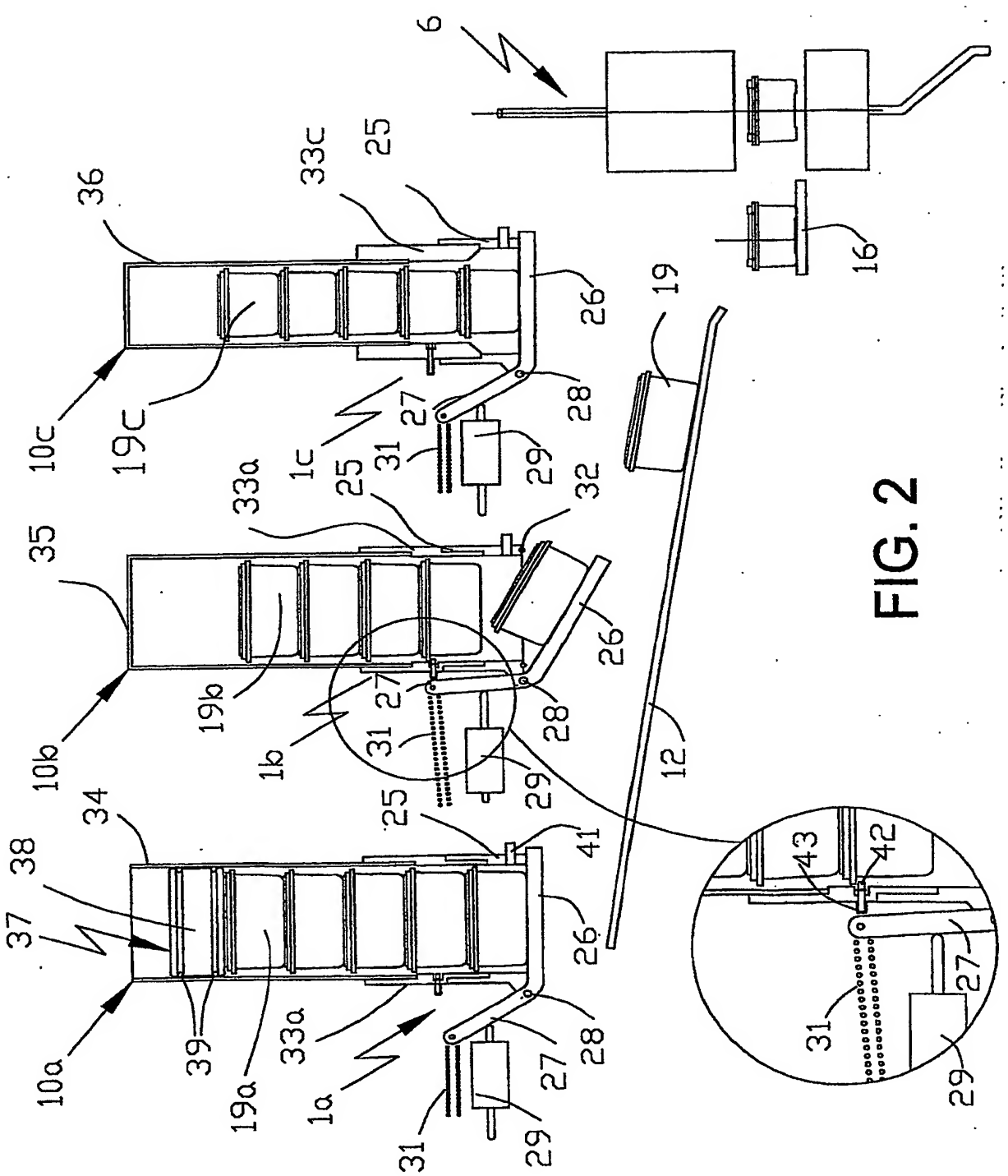

6
16
19
12
10a
10b
10c
19a
19b
19c
1a
1b
1c
25
26
27
28
29
31
32
33a
33c
34
35
36
37
38
39
41
42
43

FIG. 2

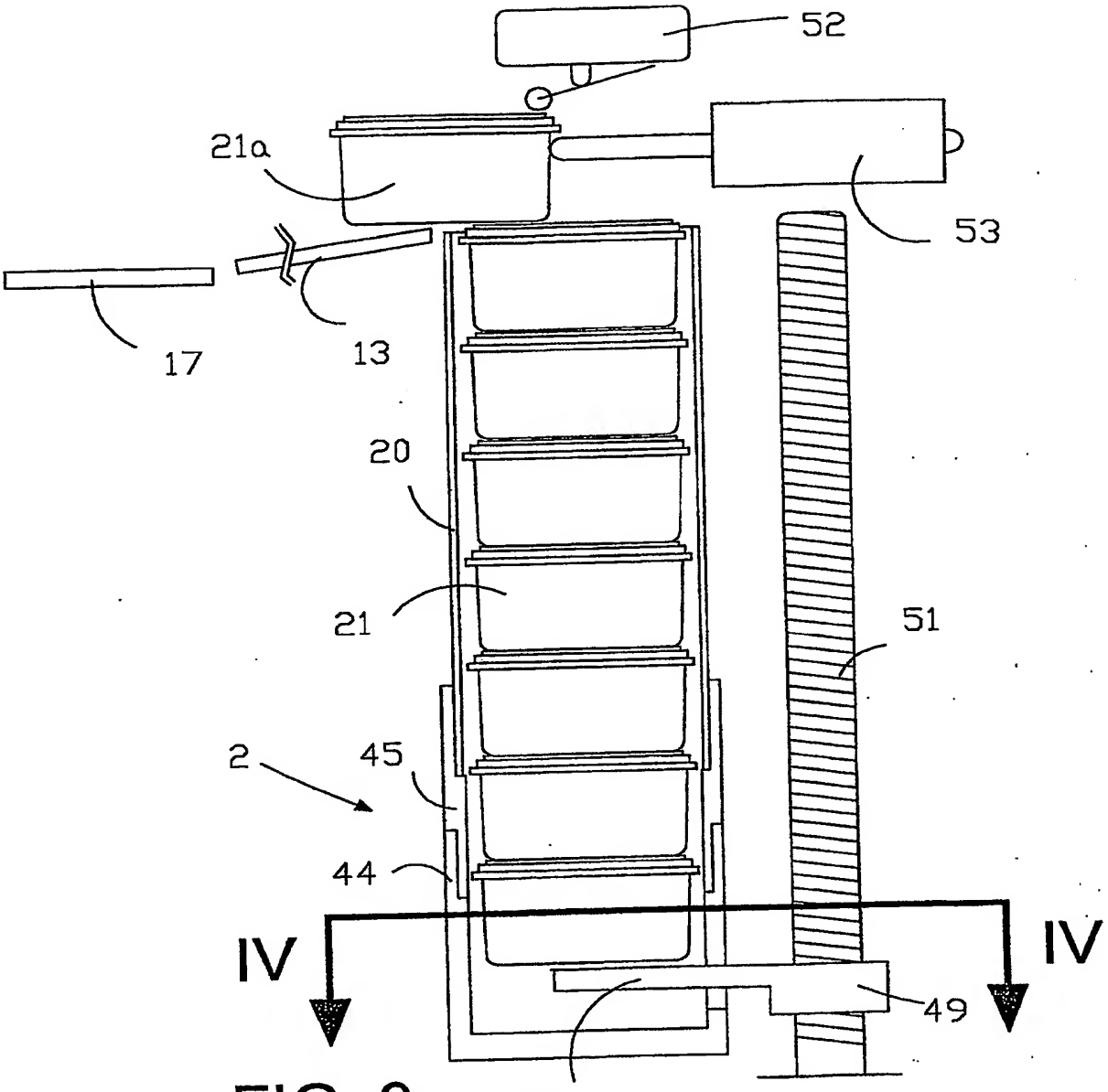


FIG. 3

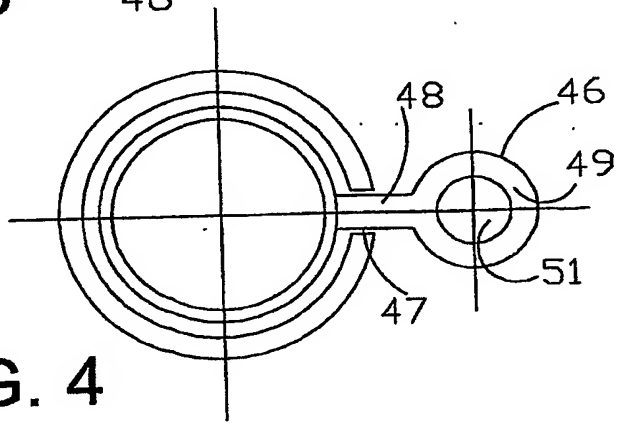


FIG. 4

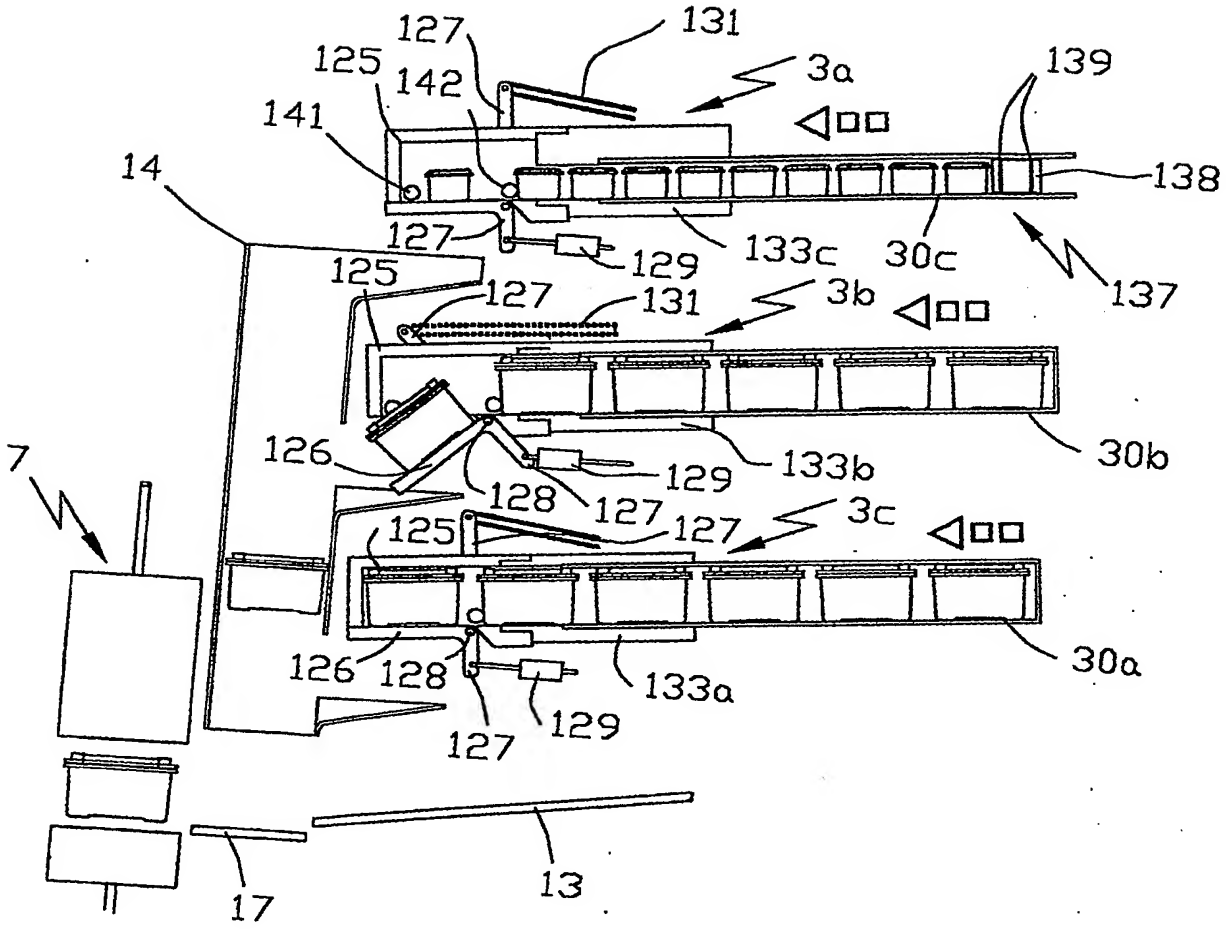

127
131
125
142
3a
139
141
138
14
127
129
133c
30c
137
125
127
131
3b
126
133b
30b
7
128
127
127
3c
125
126
128
133a
30a
129
127
17
13

FIG. 5

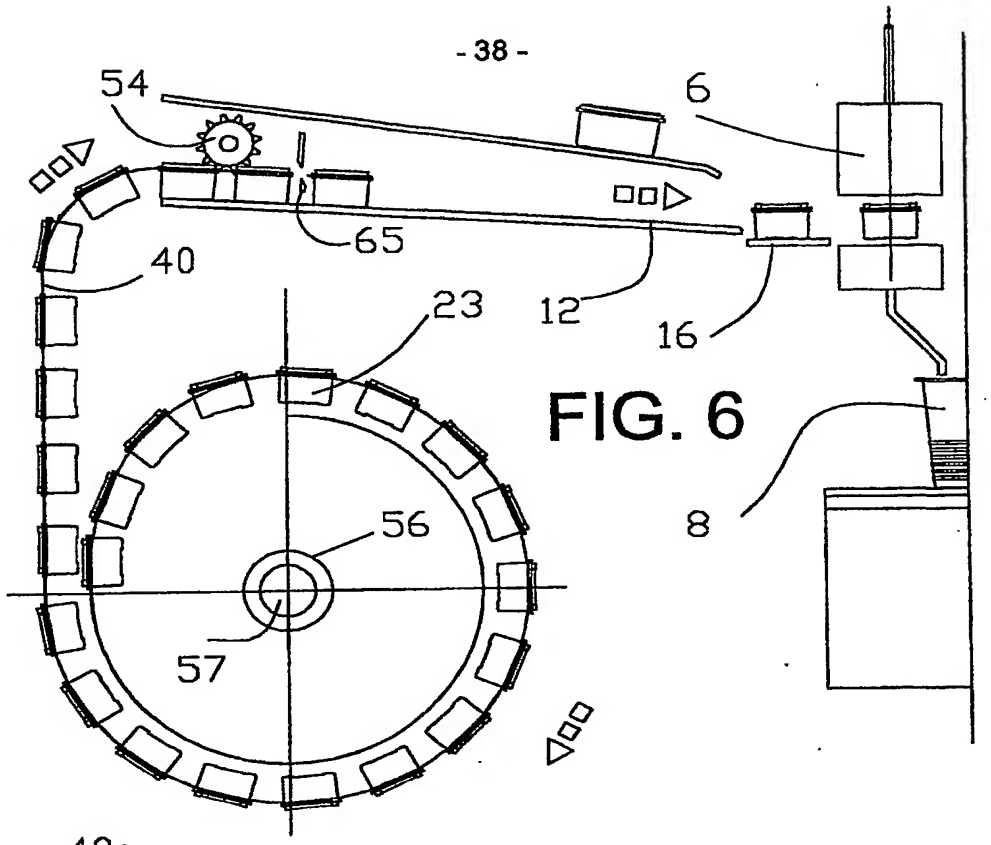


FIG. 6

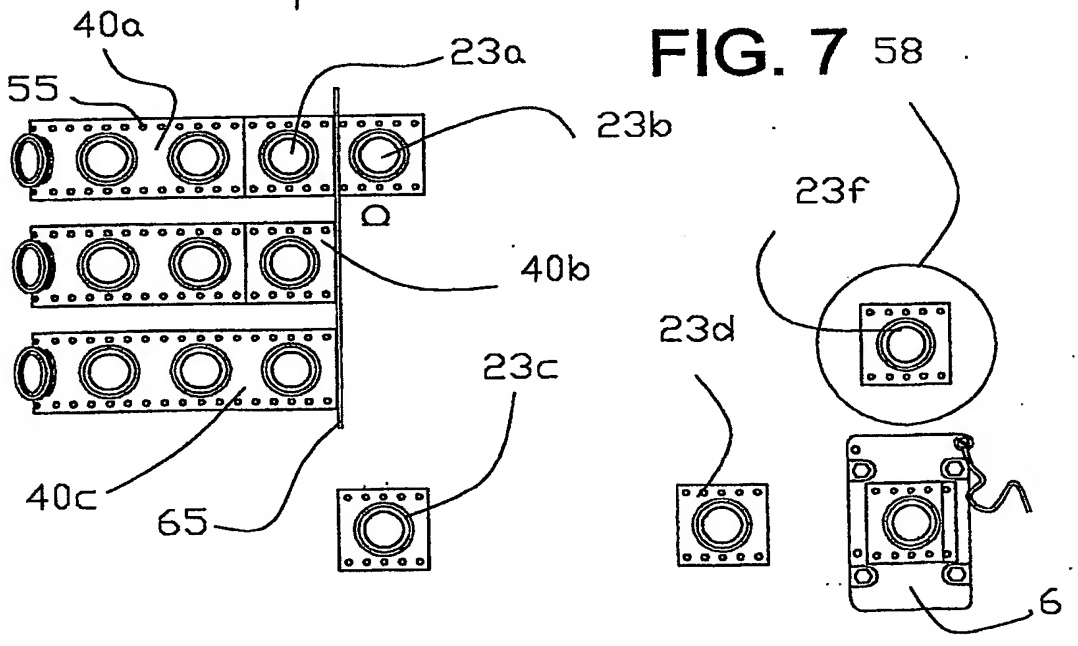


FIG. 7

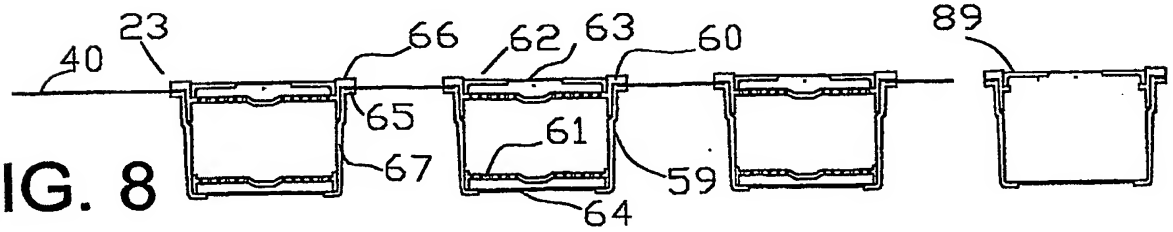


FIG. 8

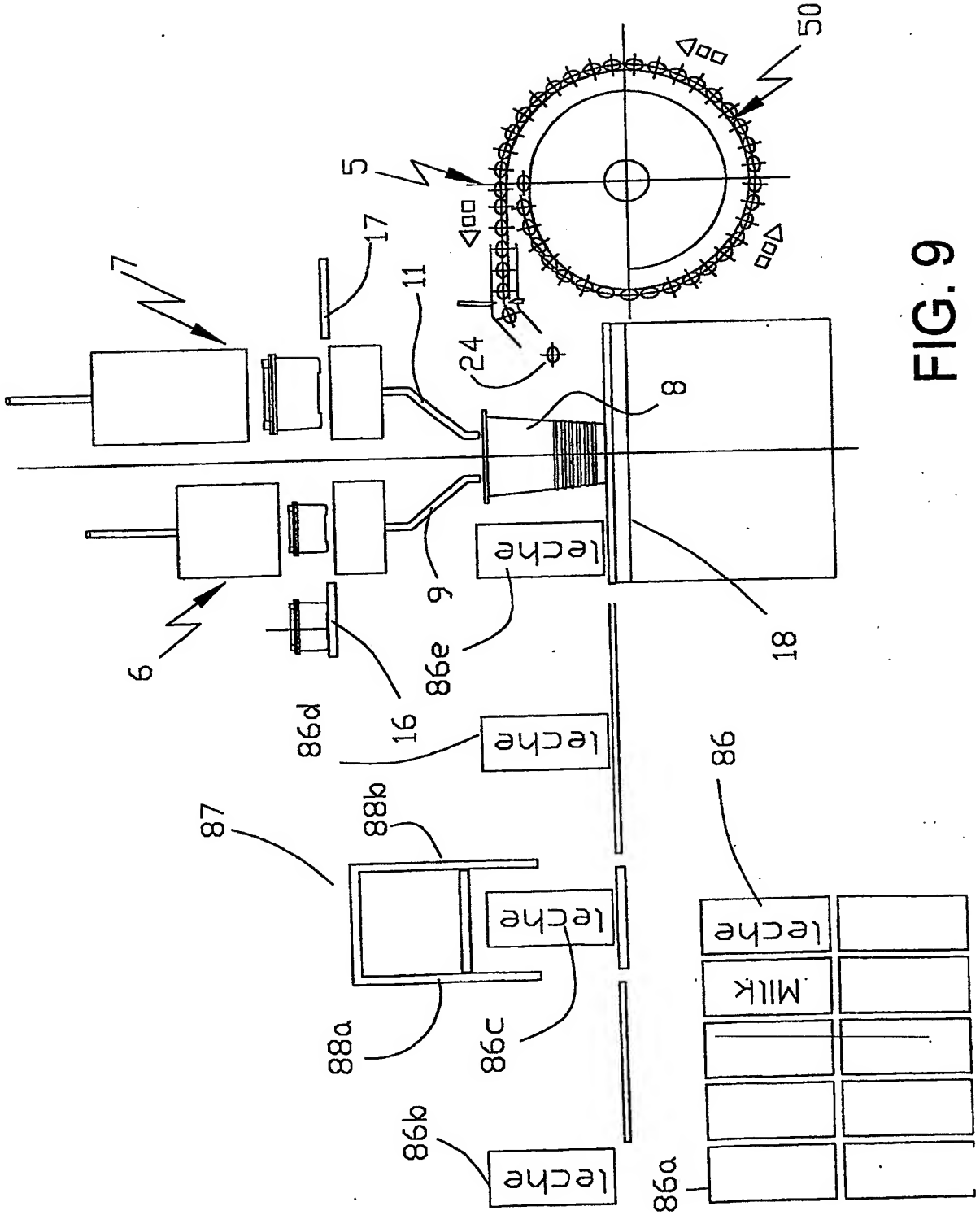

50
5
17
11
7
24
8
9
6
18
86e
16
86d
86b
87
88a
86c
88b
86
86a
Milk
lechе

FIG. 9

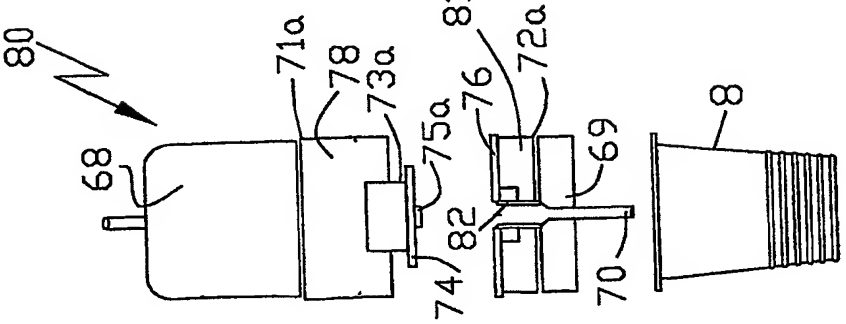


FIG. 10

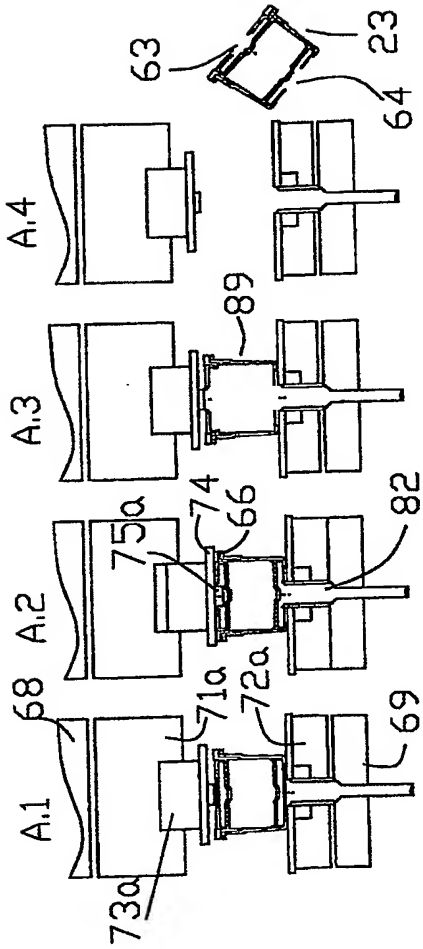


FIG. 11

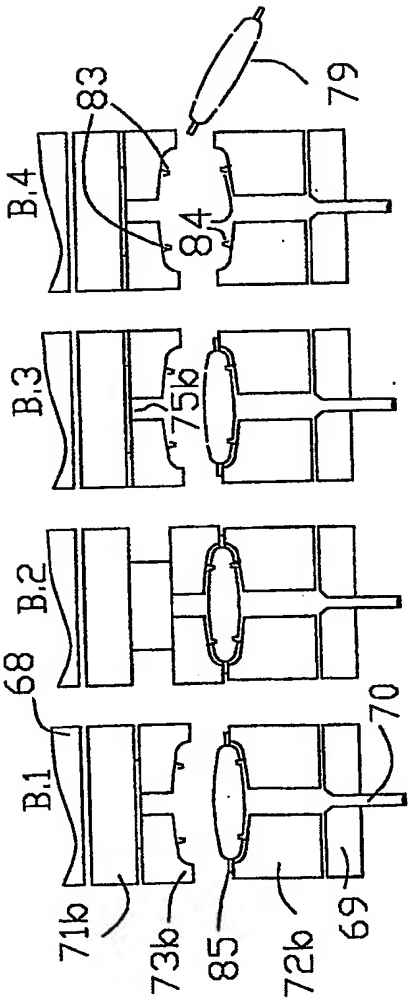


FIG. 12

D7

A METHOD, MACHINE AND PACK FOR THE PREPARATION AND DELIVERY OF HOT AND COLD DRINKS

DESCRIPTION

Technical field

The present invention relates to a method for automatically preparing and delivering hot and cold drinks such as, for example, expresso coffee, freeze-dried coffee, decaffeinated expresso coffee, hot chocolate, tea, lemon tea, camomile tea, pennyroyal and other infusions, clear soups,.., from single dose capsules of product in the solid state. In a second and a third aspect, the invention relates to a machine and to a pack of doses for the implementation of the method.

The method of the invention also permits the automatic preparation and delivery of hot or cold drinks from liquid single doses packed in unitary containers, for example UHT milk, cocoa, etc.

The method of the invention permits the automatic preparation and delivery of hot drinks by a combined method according to which the hot drink is prepared from one or more single dose capsules in the solid state, for example coffee with milk, from a single dose of expresso coffee and a single dose of powdered milk, and also permits the automatic preparation and delivery of hot drinks by a combined method according to which the hot drink is prepared from a single dose of product in the solid state and a single dose of product in the liquid state, for example expresso coffee with liquid UHT milk.

The method of the invention is applicable, with various degrees of automation and development, to machines for domestic use known as "domestic coffee-makers", is applicable to machines known as "office

coffee machines" which are used to provide service to groups with a small number of persons (offices, workshops, schools, etc.)., is applicable to machines for the hotel, restaurant and catering trade known as "professional coffee machines", and is also applicable to self-service machines for large groups of users, i.e., "vending machines".

Background of the invention

There are on the market a wide range of machines for preparing/dispensing hot drinks, and they will all be referred to hereinafter by the general term of *coffee machines*.

In general, the coffee machines prepare expresso coffee and some of them prepare other hot drinks such as, for example, freeze-dried coffee, infusions, tea, clear soups, expresso coffee with milk, etc.

Of the various hot drinks that can be prepared by said coffee machines, the preparation of expresso coffee with milk presents the greatest degree of difficulty.

There are no known automatic systems for preparing and obtaining expresso coffee with milk, of the highest quality, which maintain the aroma and flavour of the expresso coffee from the first to the last serving and which, using liquid milk, meet the most demanding public health requirements.

The conventional method for preparing expresso coffee with milk is described below.

Coffee machines having a high degree of automation and having the greatest number of integrated functions carry out the complete process, and the less automatic ones carry out only part of said process, the user having to perform the remainder of the operations manually.

The automatic machines which prepare expresso coffee with milk do so starting from powdered milk, using processes not exempt from a certain risk from the public health point of view, and no automatic machines are known which prepare expresso coffee with liquid milk.

The conventional process for the preparation of expresso coffee with milk consists of the following steps:

- grinding coffee;
- measuring out the amount of coffee required for one serving;
- introducing the dose of ground coffee into a generally frustoconical receptacle closed laterally and partially closed at the top and bottom by one or more filters which prevent the emergence of solid particles but permit the passage of liquids;
- placing the receptacle on the mouth piece of the hot water injector of the coffee machine;
- closing, under pressure, the coffee-containing receptacle against the mouth piece of the water injector;
- injecting hot water under pressure through the receptacle which contains the coffee;
- collecting the expresso coffee in a cup or beaker previously placed beneath the injector;
- measuring out the amount of powdered milk sufficient for preparing a coffee with milk;
- adding a dose of powdered milk with hot water to a small cup with beater, which will follow the path through a silicone tube to the expresso coffee and adding hot water (if the expresso coffee with milk is prepared "manually", once the expresso coffee is

obtained, liquid milk is added, which, since it is not hot, cools the coffee slightly);

- adding sugar, (optional);
- serving;
- removing from the mouth piece of the injector, by means of ejection means, the receptacle which contained ground coffee and which, after the preparation of expresso coffee, contains coffee grounds;
- extracting and disposing off the grounds from the receptacle;
- cleaning the receptacle; and
- checking and replenishing stocks (only in automatic machines).

The quality of the coffee with milk prepared from a granular product by following the conventional method described depends on multiple variables that are difficult to control, both when the final preparation is carried out in machines for domestic use and when it is carried out in automatic machines such as, for example, vending machines.

The factors which affect the quality of the expresso coffee with milk, inasmuch as they relate to its flavour and aroma and to its hygienic characteristics, can be divided into three large groups.

With respect to the storage factors, in order to preserve the aroma and freshness it is necessary to keep the coffee, until the moment of preparation, closed in a sealed container, preferably without air.

In automatic machines of the vending type this requirement is not fulfilled, owing to the fact that the granular coffee is stored in containers of up to 5 kilos capacity, which may for many weeks, until replacement, be substantially empty, that is to say, with a few grams

of coffee and several litres of air, thereby accelerating the oxidation of the coffee so that the aroma and freshness are lost. In applications for domestic use and for use in the hotel, restaurant and catering trade, preservation depends on the experience and care provided by the user.

With regard to the grinding, measuring and pressing, it should be pointed out that, in order to prepare a good quality expresso coffee, it is necessary to conform to the parameters established by the supplier of the product concerning grinding, measuring and pressing.

In automatic machines of the vending type, grinding, measuring and pressing depend on the precise adjustment of the machine, which varies over the course of time, depending on the maintenance and wear of the mechanisms. Such factors are also sensitive to variations in ambient temperature and humidity. In applications of the domestic type or hotel, restaurant and catering trade type, grinding, measuring and pressing depend on the experience and care provided by the user.

With regard to the factors of hygiene and cleanliness, it should be noted that the residues of previous servings may contaminate a fresh serving.

In manual machines, the hygiene and cleanliness of the machine depend on the experience and care provided by the user.

In automatic machines, especially vending type machines, it is difficult to maintain the machine in an adequate state of cleanliness and hygiene, since residues accumulate in inaccessible areas of the measuring mechanisms, especially in the endless worms for measuring out clear soup, sugar and powdered milk,

and also in the silicone tubes (normally 20 to 30 centimetres long) which convey the prepared product to the cup. Said residues, because they come from perishable foods, deteriorate over time and may cause upsets or public health problems. The temperature and humidity inside the vending machines are high, owing to the inherent characteristics of what is served by such machines, and there is an additional risk factor caused by any residue that may adhere to any part of its path and deteriorate rapidly, contaminating the subsequent servings more severely.

A machine is known, from Patent Application EP 1 002 490 A1, for distributing drinks from single dose portions in powder form, stored inside the machine.

From Patent Application EP 1 089 240 A2 an automatic drinks vending machine is known which has a plurality of stores of capsules, each one of which contains a drink extract in powder form, and means for transferring said capsules from the capsule stores to a position where the drink is prepared.

Said patent applications provide improvements with regard to hygiene and cleanliness factors, but not with regard to the preservation of the aroma and freshness of the product, because, owing to the fact that they are open capsule stores, they do not preserve the aroma and freshness of the extract in powder form stored in the capsules, which cannot be hermetically sealed, taking into account that the conventional system of hot water injection is not compatible with hermetically sealed capsules. The machine described in patent application EP 1 002 490 A1 accepts only one type of capsule and, although the system described in patent application EP 1 089 240 A2 allows for the content of the capsules to be different, it does not allow for capsules of different

sizes or shapes. In both cases the loading of the capsules into the respective stores is made one by one, involving the risk, in the case of the system described in patent application EP 1 089 240 A2, that capsules with different contents may be mixed in the same store.

There are at present on the market various types of conventional single doses of different shapes and volumes suitable in each case for the product which they contain according to the each manufacturer's own design. There are also on the market specific machines for each capsule, but none of said known machines can process two different types of capsules and no capsule can be processed in two types of machine.

The conventional single doses existing on the market can be classified in three large groups:

- A) unsealed single dose capsules of product in the solid state,
- B) sealed single dose capsules of product in the solid state, and
- C) single dose containers of product in the liquid state.

Drinks made from unsealed single dose capsules of product in the solid state are prepared in non-automatic machines adapted to the characteristics of each single dose, equipped with conventional hot water injectors for the preparation of drinks.

Drinks made from sealed single dose capsules of product in the solid state are prepared in non-automatic machines, adapted to the characteristics of each single dose and equipped with conventional hot water injectors and elements which break the seal of the capsule before initiating the injection of hot water.

No automatic machines are known for the preparation of hot drinks made from single doses of perishable products in the liquid state, for example single doses of UHT milk.

Explanation of the invention

The aim of the present invention is to provide a new automatic method for preparing hot drinks: expresso coffee, freeze-dried coffee, decaffeinated expresso coffee, hot chocolate, tea, lemon tea, camomile tea, pennyroyal and other infusions, clear soups, etc. from single dose capsules of product in the solid state, which provides a complete and simultaneous solution to each and every one of the above mentioned problems and drawbacks of the prior art.

In particular, an objective of the present invention is to provide a single machine for processing different types of capsules.

To this end, according to a first aspect of the present invention, a method is disclosed for the preparation and delivery of hot drinks, having the features of claim 1.

Other features of the method according to the invention are defined in claims 2 to 10.

According to a second aspect of the invention, a pack of single doses of food product according to the features of claim 11 is disclosed.

Embodiments of the pack of the present invention are defined in claims 12 to 18.

According to a third aspect of the invention, a machine for the preparation and delivery of hot drinks is disclosed, having the features of claim 19, for the

implementation of the method, and based on the new packs according to the invention.

Other features and modes of embodiment of the machine according to the present invention are defined in claims 20 to 41.

An expert in the field will understand that the present invention provides an automatic method for preparing and delivering hot drinks from liquid single doses packaged in unitary containers, for example UHT milk, cocoa, etc.

The present invention likewise provides an automatic method which makes it possible to prepare and deliver hot drinks by a combined method according to which the hot drink is prepared from single dose capsules in the solid state, for example expresso coffee, and the contents of a single dose of product in the liquid state, for example milk, is added in order to prepare, in this case, expresso coffee with milk.

Likewise, the present invention makes it possible to provide systems for storing and dispensing unsealed single dose capsules, in sealed stores arranged inside the machine. Thus, the present invention makes it possible to load and store sealed packs of unsealed single dose capsules of various products in the solid state, on measuring bases which accept packs of different measurements in relation to the measurements and characteristics of the capsules which they contain with the object of avoiding handling and mixing of products.

The invention permits the use of sealed packs of cylindrical shape with "n" capsules inside them, arranged axially one above the other. The inside diameter or measurement of the pack is related to the outside diameter or measurement of the capsule in order

to facilitate sliding and axial guiding of the capsules, preventing them from overturning.

The invention makes it possible to prepare selectively, one by one, the capsules of the pack from the inside of the base on which the pack is inserted in the machine and to convey the capsules selectively to the water injector and insert them.

According to the present invention, when the user of the machine, by means of conventional systems, selects a drink, for example expresso coffee, the machine automatically and selectively separates from one of the stored packs which contain the single dose of the selected product a single dose unit of product and automatically prepares and dispenses the drink, for example expresso coffee.

The present invention allows the remainder of the single doses of a pack of single doses that are not used for the preparation of the last serving required by the user (including those which formed part of the pack with the last single dose used) to remain in their original packs, maintaining the hermetically sealed conditions of the pack.

A great advantage enjoyed by the present invention is that it makes it possible, with a single type of injector, to use capsules of different sizes and shapes, without doing more than change or adjust the clamps.

In addition, one or more conventional hot water injectors may be located in the dispensing machine, each one with clamping flanges having shapes and characteristics suitable for each of the various measurements and characteristics of the different types of capsule stored in the machine.

It will then be understood that the invention makes it possible to dispense liquid single doses with or

without prior heating into a cup arranged for the purpose, which may be empty or contain a serving prepared by the same machine, for example an expresso coffee for preparing, in this case, an expresso coffee with milk. The order of pouring liquids onto the cup intended for consumption may be reversed, that is to say, in the case of the previous example, pouring first the milk and then the expresso coffee into the same cup.

Brief description of the drawings

Other features and advantages of the present invention are described hereinafter, with reference to some preferred embodiments thereof, illustrated by way of non-limiting example in the appended drawings, in which:

Figure 1 is a diagrammatic view in elevation of a machine which incorporates the method and part of the mechanisms of the invention.

Figure 2 is an enlarged view in elevation of a detail of said machine which corresponds to dispensing mechanisms with bottom axial discharge for unsealed capsules stored in tubular packs.

Figure 3 is an enlarged view in elevation of a detail of said machine which corresponds to a dispensing mechanism with bottom axial discharge for sealed capsules stored coaxially in a tubular pack.

Figure 4 is a plan view of a detail, according to VI-VI, of Figure 3.

Figure 5 is an enlarged view in elevation of a detail of said machine which corresponds to dispensing mechanisms with bottom discharge for unsealed capsules stored linearly in tubular packs.

Figure 6 is an enlarged view in elevation of a detail of said machine which corresponds to a dispensing

mechanism for sealed capsules stored in a pack, in the form of a continuous belt wound in the form of a spiral.

Figure 7 corresponds to a plan view of a detail of Figure 6.

Figure 8 is a view in elevation which corresponds to a pack of sealed capsules in the form of a continuous belt.

Figure 9 shows in elevation the operating layout of a mechanism for dispensing hot drinks made from liquid single doses and also the operating layout for the mechanism for dispensing sugar and spoons.

Figure 10 corresponds to a view in elevation of an injector for hot water under pressure, with interchangeable clamps.

Figure 11 represents a sequence for drink preparation, by injecting hot water into one type of sealed single dose capsule, carried out by an injector with exchangeable clamps. Said Figure also shows the preparation and delivery of a drink made from a single dose of product in the liquid state.

Figure 12 represents a sequence for the injection of hot water into another type of sealed single dose capsule, carried out by an injector with exchangeable clamps.

Figure 13 shows in elevation a variant of a machine according to the invention, with a main drum and a plurality of secondary drums.

Figure 14 shows a plan view of the variant of the machine of Figure 13.

Detailed description of the invention

Referring to Figure 1, the reference numerals 1a, 1b, 1c designate respective assemblies of mechanisms for dispensing unsealed capsules, with bottom axial

discharge, there being inserted into each of said dispensers tubular axial packs 10a, 10b, 10c which store capsules 19a, 19b, 19c.

The reference numeral 2 designates a mechanism for dispensing sealed capsules, with top axial discharge, into which dispenser a tubular axial pack 20 storing capsules 21 is inserted.

The reference numerals 3a, 3b, 3c designate respective mechanisms for dispensing unsealed capsules, with bottom discharge, into each of which said dispensers tubular linear packs 30a, 30b, 30c storing capsules 22a, 22b, 22c are inserted; 4 designates a dispensing mechanism for sealed capsules stored in a pack of sealed capsules in the form of a continuous belt 40, wound in a spiral, which stores capsules 23; 5 is an assembly for dispensing sugar and spoons, stored in a pack in the form of a continuous belt 50, wound in a spiral, which stores servings of sugar and spoons 24; 6 designates a first injector for hot water under pressure; 7 designates a second injector for hot water under pressure; 8 is a cup which receives the hot drink dispensed by each of said injectors. The reference numerals 9 and 11 designate tubes which convey the drink from the outlet of the corresponding injectors to the cup 8; 12 is an inclined plane which receives and translates the capsules dispensed by the mechanisms 1a, 1b and 1c; 13 is an inclined plane which receives and translates the capsules dispensed by the mechanism 2.

The reference numeral 14 designates a conduit for the capsules dispensed by the mechanisms 3a, 3b, 3c; 15 is an inclined plane which receives and translates the capsules dispensed by the mechanism 4; the reference numeral 16 designates a seat where the capsules which slide irrespectively on the inclined planes 12 and 15

are collected; the reference numeral 17 is a seat where the capsules are collected which slide on the inclined plane 13 and/or circulate through the conduit 14; and 18 is a base which supports the cup 8.

In Figure 2, each of the dispensing assemblies 1a, 1b, 1c comprises a dispenser body 25 of cylindrical shape, open at both ends, the lower end being closed by a lid 26 which has an extension 27, said lid pivoting on an axis 28. An electromagnet 29 acts on the extension 27 to force the opening of said lid 26, by overcoming the force of a biasing spring 31. When the magnet is de-energised, the force of the spring 31 holds the lid closed against the lower end of the body of the dispenser, producing a sealed closure between said lid and a O-ring seal 32 which surrounds the opening located on the base of the dispenser.

The upper opening of said dispenser body 25 has a profile suitable for receiving, in a sealed manner, adapters 33 of tubular shape open at both ends. The drawing shows two types of adapters: the adapter 33a located in the dispensers 1a and 1b and the adapter 33c located in the dispenser 10c. The upper opening of each of said adapters has a profile and dimensions suitable for housing packs of capsules in a sealed manner. Onto the same capsule dispenser 1 it is possible to feed, in succession, packs of different dimensions and shapes, for example 10a, 10c, in each case changing the adapter 33, for example 33a, 33c, so that in the same type of dispenser it is possible to dispense capsules of different shapes and dimensions, for example capsules 19a, 19c.

The packs 10a, 10b, 10c respectively comprise tubes 34, 35, 36 inside which are respectively located capsules 19a, 19b, 19c having shapes, dimensions and

contents which may be different. Said packs, before being inserted into the corresponding adapter of the respective dispenser, are closed hermetically and may contain an inert gas, preferably lighter than air, to preserve the aroma and flavour of the single doses of product in the solid state. The packs have the lower end closed by a removable lid, for example made of paper, plastic, aluminium, etc., and may also have a removable upper lid. The packs 10b and 10c have only the upper lid removable, and the pack 10a also has the upper lid removable.

The operations which an operator must carry out in order to place a pack in the corresponding dispenser are as follows:

- remove the previous pack;
- remove the adapter 33 in the case where the new pack is of different dimensions from the previous one;
- put in place a new adapter suitable for the geometric characteristics of the new pack;
- remove the lower lid of the pack, for example made of paper, which hermetically closes the new pack;
- place the new pack in the corresponding adapter; and
- in the case of packs with removable upper lid, also remove the upper lid, and place inside the pack the piston assembly 37.

The piston assembly 37 comprises a piston body 38 and O-ring seals 39. The piston assembly engages in a sealed manner and slidably inside the tube 34. The weight of the piston assembly 37 collaborates with their weight so that the capsules slide down towards the outlet of the dispenser. The piston body may be of

ferromagnetic material, in which case a ferromagnetic detector 41 located at the base of the body of the dispenser 33a detects when the piston reaches its lowest position and emits a signal to the central processor of the machine, not shown, indicating that all the capsules of the pack have been dispensed.

When the electromagnet 29 acts on the extension 27 of the lid 26, overcoming the force of the opposing spring 31, the lower lid 26 of the measuring device opens and the capsule located in the lowest position is dispensed onto an inclined plane 12 which conveys it to a seat 16. Said inclined plane 12 may advantageously be substituted by a mechanical conveying means, for example a conveyor belt.

Each of the adapters 33 has a capsule retaining mechanism which comprises, for example, a pin 42 and a biasing spring 43.

During the opening of the lid 26, the extension 27 acts on the pin 42, overcoming the force of a biasing spring 43 and causing said pin to advance to a position suitable for retaining the capsule located immediately above the capsule located in the lowest position, which is the one which is dispensed in each case.

Figures 3 and 4 show a dispensing mechanism with top axial discharge 2 for sealed capsules 21 stored coaxially in a tubular pack 20. The dispensing mechanism comprises a base 44 of tubular shape with the lower end closed and the upper end open. The opening of the upper end is shaped to receive an adapter 45, said adapter being substantially cylindrical in shape and open at both ends, the upper opening of said adapter 45 being of a shape suitable for receiving internally the outer profile of packs 20. Onto the same capsule dispenser 2 it is possible to feed, in succession, packs

of different dimensions and shapes, in each case changing the adapter 45.

The tubular walls of the base 44, of the adapter 45 and of the pack 20 are open along the whole of their length via a slot 47 parallel to their respective longitudinal axes. When mounting said adapter 45 on said base 44, and said pack 20 on said adapter 45, conventional geometric locators, not shown, fix the radial position of said elements to obtain the alignment of said slots.

Through the inside of said elements 44, 45 and 20 a pusher body 46 slides coaxially. The body 48 of the pusher body 46 passes through the slot 47 and, via a sliding mechanism, for example a nut/screw 49, 51, actuated by a conventional system, not shown, pushes upwards the capsules 21 of the pack 20 which bear on said pusher body.

The operation of the dispenser assembly 2 is as follows. The operator inserts on the base 44 an adapter 45 having measurements suitable for the pack 20 which he then inserts, the geometric locators causing assembly to be effected so that the slots 27 are aligned. The control system of the machine has previously positioned the pusher body 46 in the top position of its stroke, so that the capsules 21 bear on the pusher body. At the moment when a user orders a serving of hot drink which is to be prepared from a capsule of said pack, the actuating system of the nut/screw mechanism, not shown, is actuated, causing the pusher body to rise until the capsule 21a which occupies the top position in the pack actuates a microswitch 52 located above the pack, and deactivates the movement of the nut/screw mechanism when the capsule 21a has been completely extracted axially from the pack. An electromagnet 53 then pushes the

capsule 21a, causing it to slide on an inclined plane 13 which may advantageously also be a movable belt which conveys it to the seat 17 from which it will be inserted into the respective injector.

Figure 5 shows three dispenser assemblies 3a, 3b, 3c with bottom capsule discharge, in which are respectively inserted three tubular packs 30a, 30b, 30c. The operation of said dispenser assemblies 3a, 3b, 3c is analogous to that of the dispensers 1a, 1b, 1c. The elements which in said dispenser assemblies 3a, 3b, 3c perform functions analogous to those of the elements of the dispenser assemblies 1a, 1b, 1c shown in Figure 2 have been designated with the same reference numeral as in said Figure 2, with the addition of 100.

Figures 6 and 7 show a dispenser mechanism for sealed capsules stored in a pack in the shape of a continuous belt wound in the form of a spiral.

In the machine, a plurality of packs in the shape of a spiral belt may be stored, rolled on respective reels 56. In the plan view shown in Figure 7, packs 40a, 40b and 40c have been shown.

Each pack consists of a plurality of sealed capsules 23 received at regular intervals on a continuous belt 40, said continuous belts having lines of equal holes located at regular intervals on the edges of said belt. Each belt is wound on a respective reel 56.

In the machine the packs 40a, 40b, 40c are located on a post 57 on which they can rotate freely.

The machine has toothed pinions 54 for independently driving each of the belts via the lines of holes 55. A conventional actuation system, not shown, selectively advances the belt selected for preparing the serving required by the user. The advance of the

selected belt, controlled by the actuation means, is equal to the "pack pitch" which is defined as the distance between two consecutive capsules. Once the selected belt has advanced by one step, a cutting mechanism 65 cuts through the belt and separates a capsule. The selected capsule then passes through the positions 23a, 23b, 23c, 23d, 23e, 23f. In the position 23c, the capsule is inserted into the injector 6 and in the position 23f the capsule already used is removed to a store 58 which receives the used capsules. The displacement and translation of the capsule may be effected by means of inclined planes or preferably by leading it onto conveyor belts, and the insertion and removal of the capsule in the injector may be effected by pneumatic, electromagnetic, mechanical means, etc.

Figure 8 shows a pack as a continuous belt 4 of sealed capsules, with sealed capsules 23 inserted at regular intervals into a continuous belt 40, capable of being wound up like a reel, which has entrainment holes 55 at intervals. Said sealed capsules 23 consist of receptacles 59, preferably cylindrical or frustoconical, which have the upper end open with a disc-shaped flange which projects outwards 65, a lateral wall 67 and a base 64. The base 64 has weakened zones to enable it to be torn and/or opened. The lateral wall 67 has an internal ledge suitable for receiving a top disc-shaped filter 60 which engages with the inner wall of the receptacle.

The top filter 60 has a disc-shaped flange towards the outside 66 which projects above the upper part of the receptacle 59 and which has an outside diameter substantially equal to that of the flange 65, the upper face of said disc-shaped flange 66 of said top filter 60 having a flat top face of a shape such that it creates a

hermetic seal when it is applied with pressure against the flat opposing surface of a hot water injector.

Inside said receptacles 59 and adjacent to the base 64 there is a bottom filter 61. The single dose of solid product is seated in the space defined inside the receptacle 59, contained between the two filters 60, 61 and the lateral wall 67.

A seal 62 with a weakened central zone to enable it to be torn and/or opened is seated internally in the upper part of the top filter 60, creating a space between said filter and said lid. The upper part of said lid does not project above the top of the upper face of said disc-shaped flange 66 of the top filter 60. Between the lower part of the disc-shaped flange 66 and the upper part of the flange 65 a space is defined which is of a shape suitable for engaging with an analogous shape of the belt 40 so that the capsules engage in and are retained by said belt to constitute the pack.

Said Figure 8 also shows the capsule 89 for liquid single doses having characteristics equal to the capsule 23 and in which the bottom filter 61 has been omitted and the top filter 60 has been modified by omitting the filtering surface and leaving open and without obstacles the space which was occupied by said filtering surface.

In Figure 9, the reference numeral 86 designates a single dose container of liquid drink, such as, for example, a single dose of UHT milk.

When the delivery and heating of the container 86 is selected, said single dose is translated via conventional systems, following a path, for example, 86a, 86b, 86c, 86d, 86e, from a position 86a inside the machine in which the single doses are stored conventionally, to a position 86e in which it is made available to the user who has requested the serving,

said position being located, for example, close to the cup in which is served a hot drink prepared from a single dose in the solid state, such as an expresso coffee.

In the intermediate position 86c, a microwave heating apparatus 87 heats the liquid single dose. Said microwave heating apparatus has entry and exit doors, respectively 88a and 88b, which open to permit the entry and exit of the single dose, and remain closed during the heating of said single dose. Once heating is completed, the door 88b of the microwave opens and the single dose follows the path 86d, 86e. In the case where the user has selected the serving of a cold drink, the path followed is the same, but no heating is carried out.

Figure 9 also shows a dispenser for a dose of sugar 5, in which the doses of sugar 24 are contained in a pack in the shape of a continuous belt 50, the supply of said doses being analogous to that described with reference to the continuous belt pack dispenser 4. The dispensing mechanism 5 dispenses the doses of sugar by depositing them on the base 18. On said base 18 rests the cup 8 for receiving the supply of hot drink, and the single dose of liquid drink, for example UHT milk, is dispensed with or without heating, the doses of sugar are also dispensed, and in the same wrapping which wraps the dose of sugar for a serving a spoon may also advantageously be wrapped.

Figures 10, 11 and 12 show a hot water injector 80 with exchangeable clamps, which has a fixed upper body 68 and a fixed lower body 69 with an outlet for liquids 70. Mounted respectively on said upper and lower bodies 68, 69 are an exchangeable top clamp 71a, 71b and an exchangeable bottom clamp 72a, 72b. The exchangeable

top clamp 71 comprises an upper clamp body 78 detachably connected to the upper body of the injector 68 which, in a leaktight manner, conducts the injection of water under pressure which said upper body injects in a conventional manner to the bottom outlet 75 of said exchangeable top clamp. The bottom outlet 75 forms part of a piston 73a which slides axially and hermetically inside said clamp 71a. Said piston 73a has a bottom flange 74 with a flat lower surface shaped to form a leaktight seal with a related surface of a single dose capsule.

When the injection of hot water is commanded, the piston 73a slides axially and hermetically downwards, impelled by a mechanical, resilient mechanical, pneumatic or hydraulic system until the surface 74 makes contact with the capsule, the contact with said capsule prevents the piston from continuing to descend, and the piston stops, applying a pressure via its surface 74 against the corresponding part of the capsule, creating a hermetic seal.

The bottom clamp 72a consists of a body 81 with a surface 76 on which the capsule bears, and a hollow cylindrical needle 82 shaped so as to tear or perforate the lower part of the capsule. Said needle may project above said surface 76 or advantageously be resiliently connected to the body 81 so that when the body receives the pressure transmitted to it by the capsule, which in turn receives it via the movement of the piston 73a, the needle 82 projects above said surface 76 and tears or perforates the lower surface of said capsule, returning to its rest position when the piston 73a ceases to transmit pressure.

Figure 11 shows a sequence A1-A4 in which the injector 80 injects hot water under pressure to a

capsule 23. A-1 shows the initial position of the capsule 23 located in the injector. Mounted in the injector are the top clamp 71a and the bottom clamp 72a. In the position A-2 the piston 73a has descended, the surface 74 has come into contact with the surface 66 of the capsule, creating a hermetic seal, the outlet 75a has perforated/torn the surface 63 of the capsule, and the needle 82 which projects above the surface 76 has perforated/torn the surface 64 of the capsule. Once said position has been reached, hot water is injected under pressure to prepare the hot drink from the single dose of product in the solid state contained in the capsule, said water enters the capsule through the outlet 75a, passing through the top filter, and emerges through the perforated/torn surface 64 of the capsule after having passed through the bottom filter and prepared the hot drink, the hermetic seal created between the surfaces 74 and 66 forcing all the water injected to circulate through the capsule for the preparation of the hot drink.

The position A-3 is analogous to the position A-1; when this position has been reached the hot drink has already been prepared. In this position the capsule has its surfaces 63 and 64 open/torn.

In the position A-4 the injector remains in the same position and the capsule 23 has been removed from the injector and discharged, via an automatic system, to a store for used capsules that is not shown.

In the case where the capsule was not hermetically sealed, in step A-2 it would not have been necessary to effect the opening/tearing of the upper and lower surfaces of the capsule, but the rest of the method would have been identical.

In the case where the contents of the capsule were a liquid single dose, the process would be the same as described, but without injecting water. In the position A2, the tearing/opening of the surfaces 63, 64 takes place, but hot water is not injected. In the position A3 in which the piston returns to its highest position, air enters the capsule and the drink is delivered. (In said position A3 a capsule for a single dose in the liquid state 89, for example UHT milk, has been shown).

If the user has requested a serving of hot liquid, in this case and before dispensing the serving the single dose will pass through a step of heating in a microwave oven as described and represented with reference to Figure 9.

Figure 12 shows another sequence B1-B4 in which the preparation of the hot drink starts from a capsule 79. In said capsule the entry of water into the capsule takes place via multiple perforations in its upper surface, and the hot drink emerges via multiple perforations provided in its lower surface.

In Figure 12, the reference numerals 71b and 72b respectively designate the top and bottom clamps, and 73b is the piston associated with the clamp 71b. The reference 75b designates the water inlet in the piston 73b, and 83 are axially and laterally perforated needles located in the top clamp which perforate the upper surface of the capsule and allow the pressurized water injected through 75b to enter and circulate through the capsule and emerge through axially and laterally perforated needles 84 which perforate the lower surface of the capsule, in this way preparing the hot drink. The hermetic closure between the two clamps is effected via a ring 85 of the capsule which surrounds its entire periphery. The already prepared drink emerges via the

outlet 70 to be served in a cup or receptacle that is not shown.

The following methods for the machine in Figs. 1 to 12 are described below: I. Method for replenishing material in the machine of the present invention; and II. Method for the delivery of drinks with a machine of the present invention.

I. Method for replenishing material in the machine of the present invention.

* Remove from the dispensers 1 the empty packs 10.
* Put new packs in place of the empty ones, first removing the lower lid of the pack.
  . If the pack has an upper lid and does not contain inert gas, remove the upper lid and put the piston 38 in place.
  . In the case where the new packs have different geometric characteristics, also change the adapters 33.
* Remove from the dispensers 2 the empty packs 20.
* Put new packs in place of the empty ones, first removing the upper and lower lid of the pack.
* Remove from the dispensers 3 the empty packs 30.
* Put new packs in place of the empty ones, first removing the lower lid of the pack.
  . If the pack has an upper lid and does not contain inert gas, remove the upper lid and put the piston 138 in place.

. In the case where the new packs have different geometric characteristics, also change the adapters 133.

* Remove from the dispensers 4 the empty reels 56.

. Put new packs 40 in place.

* Replenish liquid single doses.

* Remove from the dispensers 5 the empty reels.

. Put new packs 50 in place.

* Check the stock of cups and replenish if necessary.

* Fill the water reservoir.

* Advantageously, when replenishing stocks, the operator, by means of a bar code scanner, portable or associated with the machine, reads the bar code of the packs being extracted and of the packs being put into place, and the central processor receives data via reading, detection or keying-in as to which dispensers the packs have been fitted into. The central processor thereby knows the stock available and the location of the stock.

II. Method for the delivery of drinks with a machine of the present invention.

* The user selects the drink - (To make the selection, the user takes advantage of being able to see which single dose, type and make are available in the machine).

* In the case where the drink selected is not available, the conventional central processor of the machine gives a warning signal of product not available. (The machine is

equipped with counting and checking systems which make it possible to know whether the machine has stocks available for preparing the drink selected).

* The user makes a prepayment in a conventional manner.
* The machine dispenses a cup in a conventional manner.
* If the drink selected must be prepared from a single dose stored in a dispenser 1, the central processor of the machine actuates the electromagnet 29, which opens the door 26, and dispenses a capsule onto the inclined plane 12 which conveys it to the seat 16, said inclined plane advantageously being able to be substituted by a moving belt or other conveying system.
* If the drink requested must be prepared from a single dose stored in a dispenser 2, the central processor of the machine actuates the actuating mechanism until the microswitch 21a signals that the capsule has reached the highest outlet position of the pack. The central processor of the machine then actuates the conventional pusher body which dispenses the capsule onto the inclined plane 13 which conveys it to the seat 17.
* If the drink requested must be prepared from a single dose stored in a dispenser 3, the central processor of the machine actuates the electromagnet 129, the door 126 opens and dispenses a capsule which drops via the tube 14 onto the seat 17.

* If the drink requested must be prepared from a single dose stored in a dispenser 4, the central processor of the machine actuates the actuating mechanism, causing the belt to advance by one step and stop, then the cutting mechanism 56 is actuated and dispenses the capsule onto the inclined plane 16.
* The seats 16, 17 have conventional systems for detecting the arrival of the capsule and for reading the bar code of each one. In the case where the capsule does not reach said seats 16, 17, the central processor commands the interruption of the service and the return of the prepaid money. If the detectors read that the capsule that has arrived is not that requested by the user, the capsule is refused and the delivery process starts again. If the detectors read that the capsule that has arrived is that requested by the user, the injection process is initiated.
* If the machine has only one conventional injector, for example 6 or 7, an automatic insertion mechanism inserts the capsule into the injector, water is injected in a conventional manner, and the drink is delivered. A conventional mechanism then extracts the used capsule and deposits it in a store for used capsules.
* If the machine has more than one conventional injector 6, 7, an automatic insertion mechanism inserts the capsule selectively in the corresponding injector, water is injected in a conventional manner and the drink is

delivered. A conventional mechanism then extracts the used capsule and deposits it in capsule store. If the client has requested a drink which requires two single doses of product for its preparation, for example, expresso coffee with milk obtained from powdered milk, one of them is first prepared, for example, the expresso coffee, and then water is injected to the single dose of powdered milk to prepare the expresso coffee with milk.

* If the machine has an injector 80 with exchangeable clamps, prior to the insertion of the capsule into the injector the central processor, in dependence on the data supplied to it by the bar code scanners located at 16, 17, regarding the characteristics of the capsule, will effect the corresponding change of clamps, thereafter following the process as in the previous case.

* If the drink requested must be served by delivering a single dose container of hot liquid 86 and without opening, the conventional dispensing mechanism causes a single dose to advance until it is located inside the microwave oven 87, the doors 88 of the microwave oven 87 are then closed, and heating takes place, then the microwave opens and the capsule continues to move until it is deposited on the platform 18 at the disposal of the user.

* If the drink requested must be served by pouring the contents of a liquid single dose 89 into a cup 8, the capsule, once it is

dispensed from the pack which contains it, for example by the dispensing mechanism 2, is inserted into the injector 80 which, informed of the characteristics of the capsule by the reading of its bar code, will open/tear it at its upper and lower surfaces without injecting water, permitting the entry of air which facilitates the outflow of liquid and pouring thereof into the cup 8.

* If on requesting the drink the user has also requested the serving of sugar/a spoon, the dispensing mechanism for sugar/a spoon 5, in a similar manner to the dispensing mechanism 4, dispenses a dose of sugar/a spoon. In this case the dose of sugar/a spoon is dispensed directly onto the platform 18.

Figures 13 and 14 describe another preferred embodiment of the machine according to the invention.

The machine comprises a lower part of a static frame 219 of the machine, on which is rotatably supported a main drum 201 which contains a plurality of secondary drums 200 rotatable with respect to the main drum, each of them configured so as to contain a plurality of tubular packs 209, which contain capsules 217.

The packs 209 are distributed evenly and concentrically with respect to the axis 206 of their respective secondary drum 200.

The secondary drums 200 are distributed evenly and concentrically with respect to the axis 204 of the main drum 201.

Firmly connected to the lower part of the static frame 219 of the machine there is a conventional main actuating and control mechanism 210, which controls the

rotation of the main drum 201, so as to rotate the main drum in order selectively to bring the selected secondary drum into the selection position.

On the upper part of the static frame 212 a single secondary actuating and control mechanism 211 is located which selectively controls the rotation of the secondary drum 200 positioned in the selection position, in order to bring one of the packs of said selected drum into the selection position.

A selection device 214, having a main body 216 in the shape of a rotatable disc, selectively receives on a seat 221 for capsules the selected capsule 217a and positions it on the conventional injection pump 218 for the preparation of the hot drink.

During the process of selection of the secondary drum and pack, the disc of the selection device remains in an inoperative position so that the seat 221 for the capsules remains in a position located outside the path of the drums and packs.

The method for preparing the drink comprises the following steps:

First, the main control mechanism 210 rotates the main drum 201 to bring the secondary drum 200a which contains the selected pack into the selection position.

Secondly, once the selected secondary drum 200a has been placed in the selection position, the secondary actuating and control mechanism 211 rotates the selected secondary drum in order to bring the selected pack 209a into the selection position.

Thirdly, once the selected pack is in the selection position, the main body of the selection device 216 is rotated in order to drop a selected capsule 217a into the capsule seat 221.

Fourthly, once said selected capsule has dropped into the capsule seat of the selection device, the main body of the selection device is rotated and translates the capsule 217b to the delivery position, in which water is injected and the hot drink is prepared.

When the main body of the selection device rotates and translates the capsule from the selection position to the delivery position, the upper part of said disc prevents a new capsule from emerging from the packs, so that a new selection can be made of main drum and pack which will not be operative until the seat 221 for capsules 217a of the main body of the selection device 216 is brought into the selection position again.

The main body of the selection device 216 has four positions, and a single seat 221, which are clearly visible in Fig. 14: in the first position, on the right, it receives the seat 221 for the selected capsule 217a of the selected pack 209a of the selected drum 200a; in the second position, at the top, it breaks the seal on the upper and lower part of the capsule; in the third position, on the left, the capsule 217b is placed in the delivery position; and in the fourth position, at the bottom, the step of expulsion of the used capsule takes place.

Each of the secondary drums 200 comprises a secondary central post 206, a bottom end 208, a top end 207 and a gearwheel 222. The bottom end is rigidly connected to the secondary post. The upper end can slide axially on said post to adapt to the different lengths of the packs contained in the drum, and the gearwheel is firmly connected to the upper end of the post of the secondary drum.

Each of the respective secondary drums can rotate in a controlled manner about its respective secondary central axis.

A retaining mechanism 213 retains the drum in the selected position so that it prevents the rotation of the drum on its axis, so that each of the secondary drums can rotate on its own axis only when it is placed in the selection position and the secondary actuating and control mechanism 211 releases the conventional retaining mechanism 213 associated with each secondary drum, which retains and actuates it via said mechanism in order to rotate the drum on its own axis and bring the selected pack into the selection position.

The bottom end comprises N internal profiles for engaging with the external profile of the pack, the top end engages with the profile of the upper part of the pack and the distance in a longitudinal direction between the ends can be adjusted to adapt to the different lengths of the packs contained in each drum.

The packs, when placed in the respective secondary drums, are open at the bottom so that the capsule located in the lower part of each pack bears in succession, during the selection process, on the upper surface of the lower part 219 of the machine, on the upper surface of the bottom end of the main drum 202, and on the upper surface 216 of the main body of the selection device 214, before being seated selectively on the capsule seat 221.

The main rotatable drum 201 comprises a bottom end 202, a top end 203, a main post 204 and a toothed pulley 205, firmly connected to the lower end of said post.

The bottom and top ends are constituted by annular surfaces firmly connected to the main post and form an

assembly which can rotate in a controlled manner about said main post.

The secondary drums are distributed evenly inside the main drum, so that their axes are parallel and equidistant from the axis of the main drum.

Each of the secondary posts, at its lower part, bears rotatably on a suitable seat located in the bottom end of the main drum. With its upper end, said secondary post is seated in a suitable opening formed in the top end of the main drum. The upper end of the secondary post projects above the upper end of the main drum so that the toothed pulley firmly connected to said post is located above said top end.

The central post of the main drum bears rotatably on the lower part 219 of the machine.

The lower end of the main post projects below said lower part 219 of the machine so that the toothed pulley 205 firmly connected to its bottom end is located below said lower part.

The upper surfaces of the lower part 219, of the bottom end of the main drum 202 and of the main body of the selection device 216 are at substantially the same height and are adjusted so that in a horizontal direction they do not exhibit any noticeable discontinuities, so that they constitute, *de facto*, a single surface on which the capsules bear and slide before being selected.

The present invention having been described sufficiently, the experts in the field will understand that with the packs, the machine and the methods of the present invention all the objectives of the present invention are successfully achieved.

The invention should not be regarded as being limited to the details described, and any modifications

and variations which may be necessary may be effected during its production, without thereby departing from the scope thereof, which is defined in the appended claims.

All the technical features mentioned in the claims are followed by reference symbols which are included for the sole purpose of facilitating the understanding thereof and without having any limiting effect on the scope thereof.

CLAIMS

1. A method for the preparation and delivery of hot drinks, in a machine for preparation and delivery, the method comprising the steps of:

storing in storage means at least one capsule (5, 19, 19a, 19b, 19c, 21, 21a, 22a, 22b, 22c, 23, 23a, 23b, 23c, 23d, 23e, 23f, 79; 217a, 217b, 217c) containing a dose of the solid product from which the hot drink is prepared;

transporting the capsule, by means of conveying means, to a station for injecting water under pressure (6, 7, 68, 80; 218);

preparing the drink by injecting water under pressure through the capsule; and

expelling the capsule from the water injection station,

characterized in that it also comprises the steps of:

storing the capsules, in said storage means, in at least one pack (10, 10a, 10b, 10c, 20, 30, 30a, 30b, 30c, 40, 40a, 40b, 40c; 209, 209a) of single dose capsules in which they are arranged in an ordered manner, in sequence one after the other, in at least one line or column; and

before the conveying step, removing the first capsule from at least one pack, by means of dispensing means (1, 1a, 1b, 1c, 2, 3, 3a, 3b, 3c, 4).

2. A method according to claim 1, characterized in that at least two packs of single dose capsules of the same food product are stored simultaneously in the machine.

3. A method according to claim 1, characterized in that at least two packs of single dose capsules of

different size and dimensions and for different products are stored simultaneously in the machine.

4. A method according to any one of the preceding claims, characterized in that the single dose capsules of at least one of the packs contain solid products.

5. A method according to any one of the preceding claims, characterized in that the single dose capsules of at least one of the packs contain a liquid product.

6. A method according to any one of the preceding claims, characterized in that it comprises the steps of:

selecting, in means for interface with the user, the drink to be prepared and delivered;

determining, by means of control means, the pack or packs (10, 10a, 10b, 10c, 20, 30, 30a, 30b, 30c, 40, 40a, 40b, 40c; 209, 209a) stored in the storage means of the machine which contain the capsules (5, 19, 19a, 19b, 19c, 21, 21a, 22a, 22b, 22c, 23, 23a, 23b, 23c, 23d, 23e, 23f, 79; 217a, 217b, 217c) which are involved in the preparation of the drink selected; and

finding out, by means of said control means, whether the packs determined contain at least one capsule;

7. A method according to claim 6, in which, if the finding was negative, the control means give a signal to the interface means to display the information that the selected drink cannot be prepared.

8. A method according to claim 6, characterized in that, if the finding was positive, the control means give a signal which enable the stages and steps for preparing and delivering the drink selected by the user.

9. A method according to any one of the preceding claims, characterized in that it comprises, before the step of transporting the capsule, the step of breaking a

hermetic seal (62, 64) with which the capsule (21, 21a, 23) to be transported may be provided.

10. A method according to any one of the preceding claims, characterized in that the storage step comprises arranging a first plurality of packs (209, 209a) of columns of single dose capsules (217, 217a, 217b) in a secondary rotatable drum (200), in which the packs are in a vertical parallel arrangement about the axis of rotation (206) of said secondary drum, and distributed evenly about said axis; and providing a second plurality of secondary drums (200) in a main rotatable drum (201) with the axes of rotation (206) of the secondary drums arranged parallel and evenly distributed with respect to the axis of rotation (204) of said main drum; and in that the conveying step and the removal stage comprise the steps of

rotating the main drum (201), by means of main control means (210), until a secondary drum (200a) which contains a selected pack (209a) is brought opposite the main body (216) of a selection device (214) adjacent to the injection mechanism (218);

rotating the selected secondary drum (200a), by means of secondary actuation and control means (211), until the selected pack (209a) is positioned facing said main body (216) of said selection device (214);

rotating the main body of the selection device (216) in order to drop the selected capsule (217a) into a seat (221) for the capsules; and

rotating the main body of the selection device in order to translate the capsule (217b) to the delivery position in the station for injecting water under pressure (218), in which water is injected and the hot drink is prepared.

11. A pack (10, 10a, 10b, 10c, 20, 30, 30a, 30b, 30c, 40, 40a, 40b, 40c; 209, 209a) of single dose capsules of food products for the preparation and delivery of hot drinks, according to the method of claims 1 to 10, of the type of capsules having an approximately prismatic or cylindrical shape, with closed lateral faces (67) and provided with means (66, 61) suitable for permitting the passage of liquids through the capsule and preventing the passage of solids, characterized in that it contains a plurality of capsules (5, 19, 19a, 19b, 19c, 21, 21a, 22a, 22b, 22c, 23, 23a, 23b, 23c, 23d, 23e, 23f, 79; 217a, 217b, 217c) arranged contiguously and consecutively in at least one line or column, and comprises means (62, 64) for hermetic sealing and tamper-proofing of the whole of the pack which are adapted to be easily broken when required.

12. A pack according to claim 11, characterized in that the capsules are arranged in a column of coaxially aligned capsules.

13. A pack according to claim 11, characterized in that the capsules are arranged in a line of collaterally aligned capsules.

14. A pack according to claim 13, characterized in that the capsules are supported on a continuous belt (40), capable of being wound in the form of a reel.

15. A pack according to one of claims 11 to 14, characterized in that each of the capsules comprises individual sealing means (62, 64) for hermetic sealing thereof, the seal being adapted to be broken by the effect of the pressure of the water injected.

16. A pack according to claim 15, characterized in that the capsules 32 contain a liquid product.

17. A pack according to claim 16, characterized in that said liquid product is UHT milk.

18. A pack according to any one of claims 11 to 17, characterized in that it has enclosed in it an inert gas, lighter than air.

19. A machine for the preparation and delivery of hot drinks, for the implementation of the method according to any one of claims 1 to 10, particularly from capsules (5, 19, 19a, 19b, 19c, 21, 21a, 22a, 22b, 22c, 23, 23a, 23b, 23c, 23d, 23e, 23f, 79; 217a, 217b, 217c) contained in packs (10, 10a, 10b, 10c, 20, 30, 30a, 30b, 30c, 40, 40a, 40b, 40c; 209, 209a) according to claims 11 to 18, which comprises storage means for capsules containing a dose of the solid product from which the hot drink is prepared; conveying means (12, 13, 14, 15, 16, 17; 210, 211, 212, 213, 215) for moving the capsules to a station (6, 7, 68, 80; 218) for injecting water under pressure; means for injecting hot water under pressure through the capsule; and means for expelling the used capsule from the water injection station, characterized in that said storage means comprise at least one support means (25, 125; 200 to 208) suitable for storing packs of capsules of different shapes and sizes; and dispensing means (26, 126; 214, 215) for the first capsule (217a).

20. A machine according to claim 19, characterized in that it comprises at least two support means for packs of single dose capsules of the same food product.

21. A machine according to claim 19, characterized in that it comprises at least two support means (25, 125) for packs of single dose capsules of different size and dimensions and for different products.

22. A machine according to any one of claims 19 to 21, characterized in that the single dose capsules of at least one of the packs contain solid products.

23. A machine according to any one of claims 19 to 22, characterized in that the single dose capsules of at least one of the packs contain a liquid product.

24. A machine according to any one of claims 19 to 23, characterized in that it comprises breaking means (75a, 82) for breaking the hermetic seal (62, 64) with which the capsule to be transported may be provided.

25. A machine according to claim 23 and claim 24, characterized in that the breaking means (75a, 82) are suitable for perforating the hermetic seal of the capsule at the lower part (64) and at the upper part (63) thereof, in order to facilitate the entry of air for the extraction of liquid.

26. A machine according to claim 19, characterized in that said support means (25, 125) are hermetically sealed.

27. A machine according to claim 19, characterized in that it comprises, in the storage means, dispensing assemblies (1a, 1b, 1c) provided with a dispenser body (25) of cylindrical shape, open at both ends, the lower of which is closed by a lid (26) which has an extension (27), said lid being able to pivot on an axis (28).

28. A machine according to claim 27, characterized in that it comprises pushing means (29) which act on the extension (27) to force said lid (26) to open against the force of a biasing spring (31), the force of the spring (31), when the pushing means are not operative, maintaining the lid against the bottom end of the dispenser body, with the object of producing a hermetic closure between said lid and a seal (32) which surrounds the opening located on the base of the dispenser.

29. A machine according to claim 27 or 28, characterized in that the upper opening of said dispenser body (25) has a profile suitable for seating in a sealed manner adapters (33) of tubular shape with both ends open, said upper opening of each of said adapters having a profile and dimensions suitable for seating packs of capsules in a sealed manner.

30. A machine according to claims 27 to 29, characterized in that the pushing means comprise an electromagnet (29).

31. A machine according to any one of claims 19 to 30, characterized in that it comprises a hot water injector (80) provided with exchangeable clamps, suitable for firmly clamping capsules of different shapes and sizes, said injector having a fixed upper body (68) and a fixed lower body (69) with an outlet for liquids (70), there being mounted respectively in said upper and lower bodies an exchangeable top clamp (71a, 71b) and an exchangeable bottom clamp (72a, 72b), the exchangeable top clamp comprising an upper clamp body (78), detachably connected to the upper body of the injector, which performs in a leaktight manner the injection of water under pressure which said upper body injects as far as the bottom outlet (75) of said exchangeable top clamp, the bottom outlet being arranged in a piston (73a) which slides axially and in a sealed manner inside said clamp (71a) and which has a bottom flange (74) having a flat lower surface shaped to form a leaktight seal with a related surface of a single dose capsule.

32. A machine according to any one of claims 19 to 31, characterized in that it comprises means for interface with the user, suitable for selecting the drink to be prepared and delivered; control means,

suitable for determining the pack or packs stored in the support means, which contain the capsule or capsules involved in the preparation of the drink selected, for finding out whether such packs determined contain at least one capsule, and for giving a signal to the interface means to display the information that the drink selected cannot be prepared, or to give a signal which enables the stages and steps for preparing and delivering the drink selected by the user.

33. A machine according to claim 32, characterized in that it comprises means for reading codes printed on the packs which contain the capsules and which indicate, for example, expiry date, water injection pressure, volume of water to be injected, geometric characteristics of the capsule and number of capsules contained in the pack.

34. A machine according to claim 33, characterized in that the control means are suitable for monitoring the correct insertion of the capsule in the injector which corresponds to it according to the printed codes, and for measuring out the quantity of water to be injected in dependence on the characteristics of the capsule.

35. A machine according to claim 32 or 33, characterized in that the control means are adapted to refuse expired capsules.

36. A machine according to claim 32 or 33, characterized in that the control means comprise means for preventing a capsule from being wrongly inserted into an unsuitable injector in dependence on the geometric characteristics and on the requirements of water injection pressure and volume.

37. A machine according to any one of claims 19 to 36, characterized in that the different elements of the

machine are covered by transparent covers, which allow the user to see the type of product stored in the machine before requesting the service and to observe the conditions of cleanliness and hygiene of the machine.

38. A machine according to any one of claims 19 to 37, characterized in that the storage means comprise means for storing a plurality of single dose containers (86) of liquid drink; means for selecting and heating a single dose container, and for translating said container from a position (86a) in the storage means to a position (86e) adjacent to the injection and expulsion means.

39. A machine according to claim 38, characterized in that it comprises means for heating the single dose containers (86).

40. A machine according to claim 39, characterized in that said heating means comprise a microwave (87), provided with entry door (88a) and exit door (88b), adapted to open in order to permit the entry and exit of the container (86, 86c), and which remain closed during the heating thereof.

41. A machine according to claim 19, characterized in that it comprises a static frame (219) on which bears, rotatably, a main drum (201) which in turn contains a plurality of secondary drums (200) rotatable with respect to the main drum, distributed evenly and concentrically with respect to the axis (204) of the main drum and shaped so as to contain a plurality of tubular packs (209), which contain capsules (217) stacked in vertical columns, the packs being distributed evenly and concentrically with respect to the axis (206) of its respective secondary drum, the machine also comprising:

a main actuating and control mechanism (210), which is firmly connected to the lower part of said static frame (219) and which controls the rotation of the main drum (201) for the selective positioning of the selected secondary drum in a selection position, adjacent to the injection mechanism (218);

a secondary actuating and control mechanism (211), arranged on the static frame, which selectively controls the rotation of the secondary drum placed in the selection position, in order to bring one of the packs (209a) of said selected drum into said selection position; and

a selection device (214), provided with a main body (216) in the shape of a rotatable disc, for selectively receiving the selected pack (209a) in a seat (221) of said selection device, and positioning the selected pack (218b) adjacent to the injection pump (218), for the preparation of the hot drink,

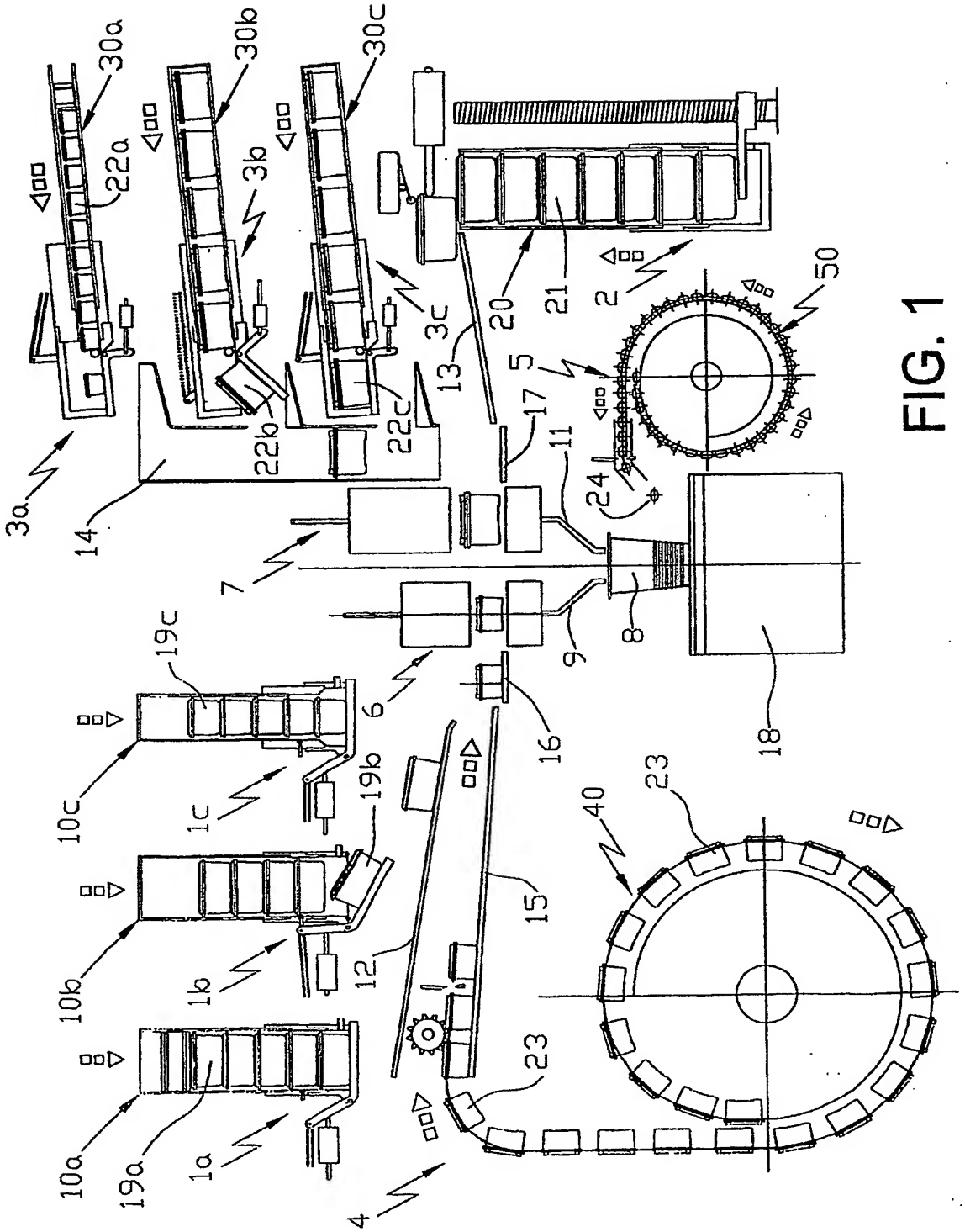
all adapted such that, during the process of selection of the secondary drum (200) and of the pack (209a), the disc of the selection device (214) remains in an inoperative position, so that said seat (221) remains in a position located outside the path of the drums (200, 201) and packs (209, 209a).

ABSTRACT

The method comprises: storing at least one capsule containing a dose of the food product from which the hot drink is prepared; transporting the capsule, by means of conveying means, to a station for injecting water under pressure; preparing the drink by injecting water under pressure through the capsule; expelling the capsule from the water injection station.

The capsules may contain liquids, and packs are stored, arranged in an ordered manner and in sequence one after the other, in at least one line or column. The first capsule is extracted from at least one pack by means of dispensing means.

The invention refers as well to the machine for the preparation and delivery of hot drinks, for the implementation of the method starting from capsules contained in packs, which machine comprises multiple support means, suitable for storing packs of capsules of different shapes and sizes.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30c
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3b
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20
21
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3a
14
7
8
9
6
16
18
19c
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1c
19b
10b
1b
12
15
40
23
10a
19a
1a
4

FIG. 1

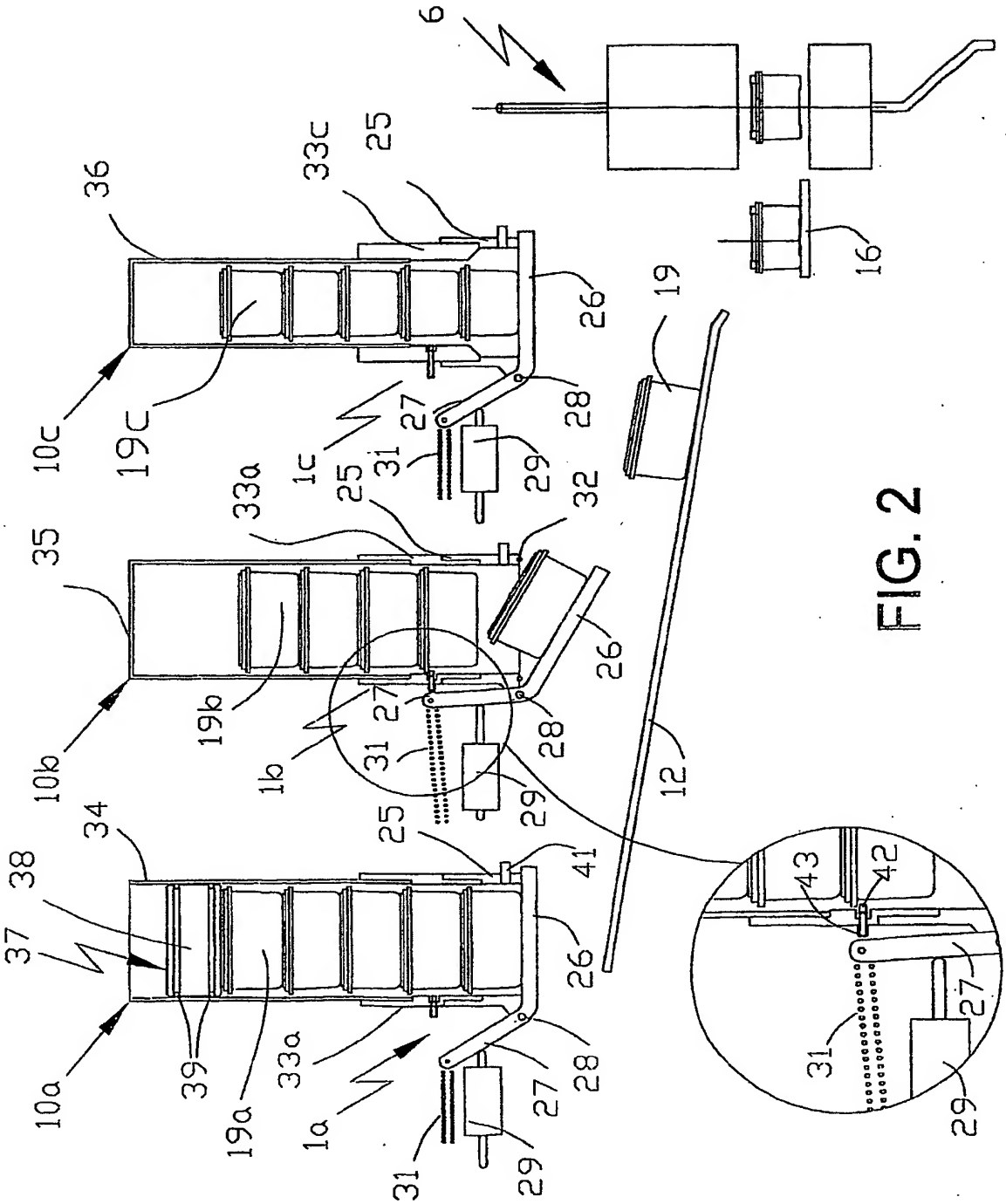
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FIG. 2

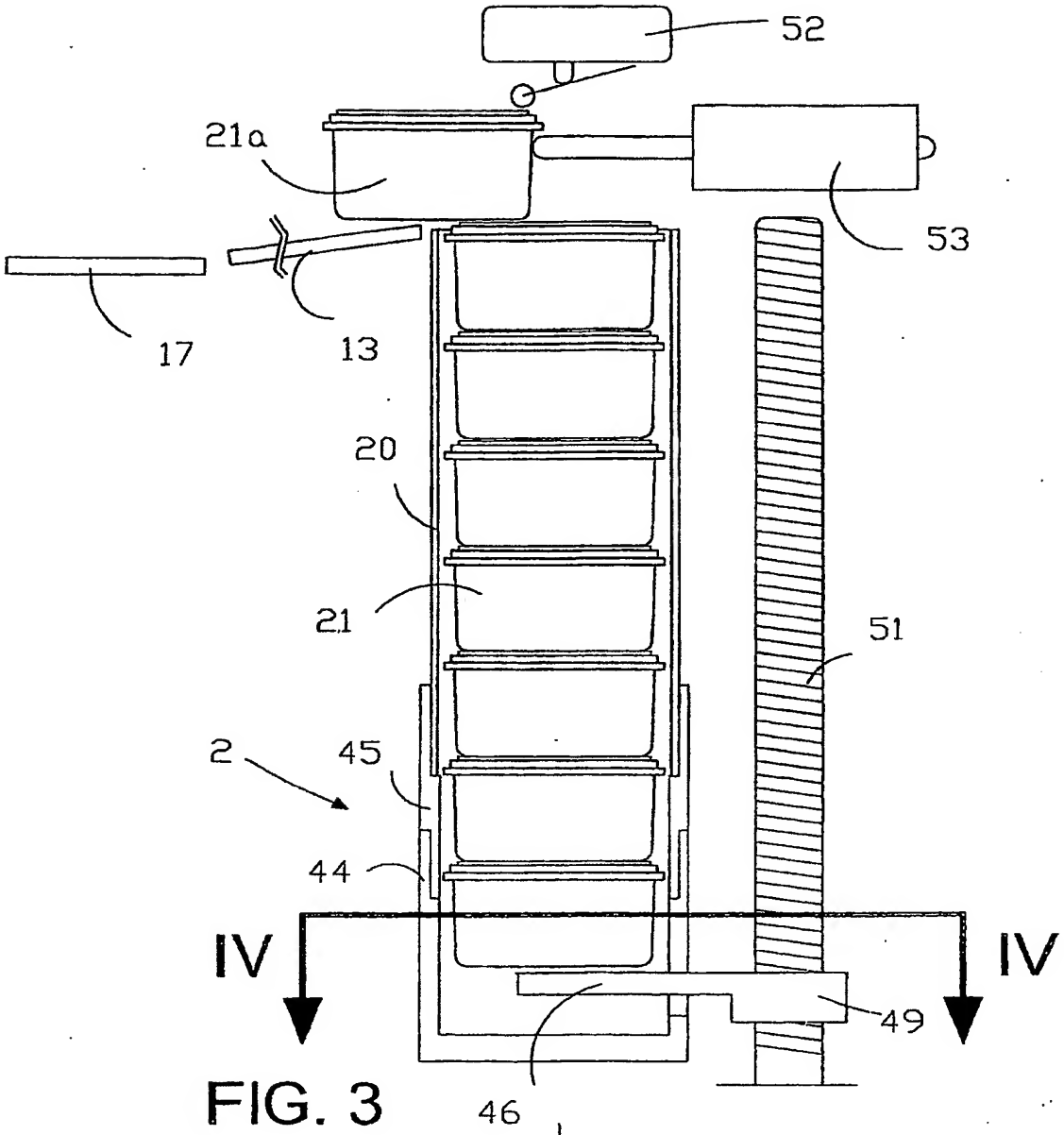


FIG. 3

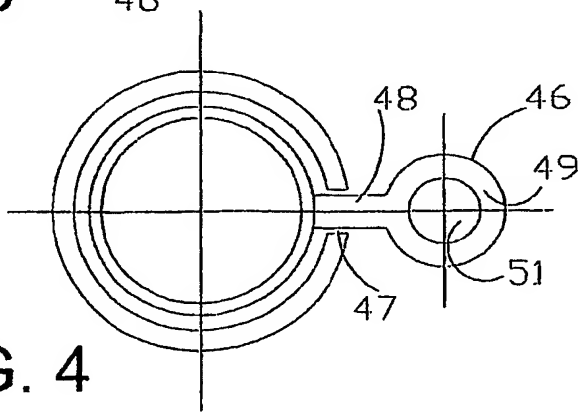
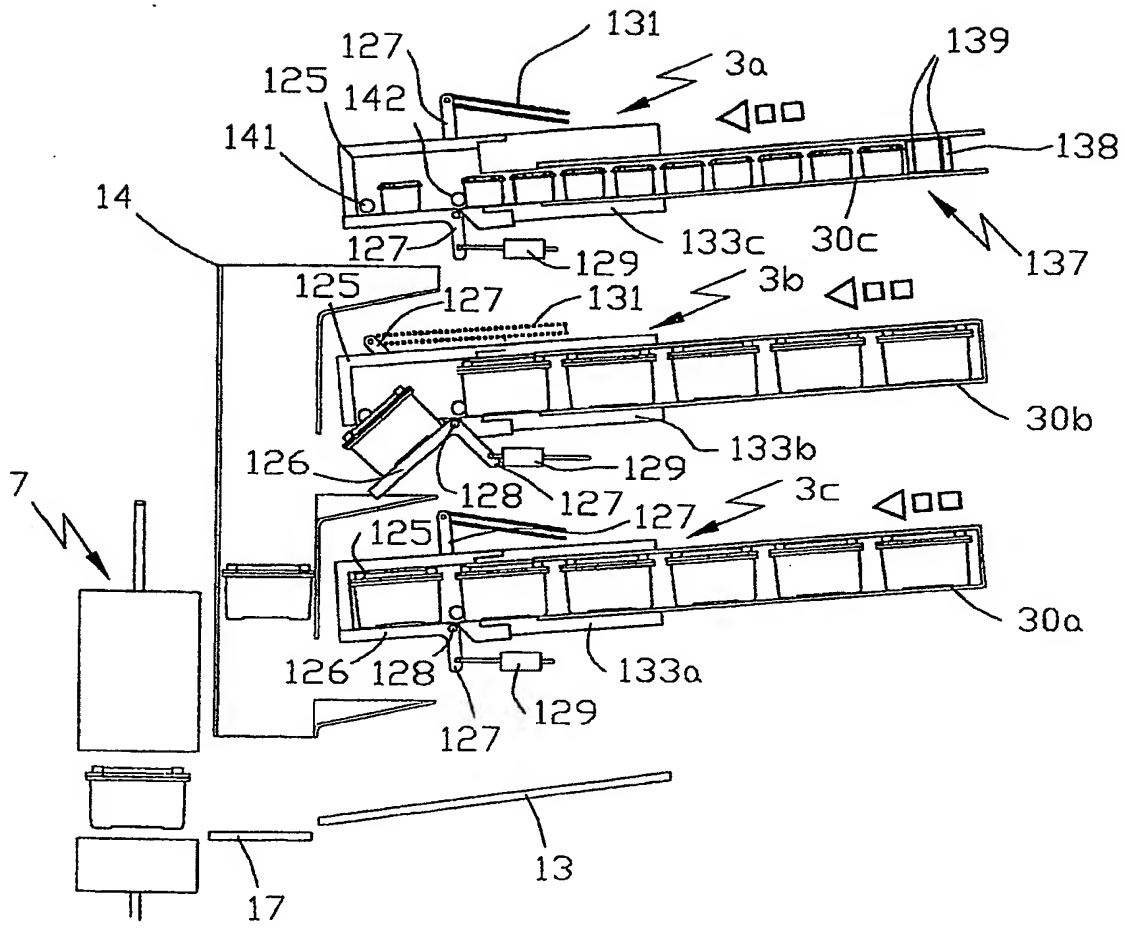


FIG. 4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127
3a
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138
14
133c
30c
137
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125
3b
131
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126
128
133a
129
127
13
17

FIG. 5

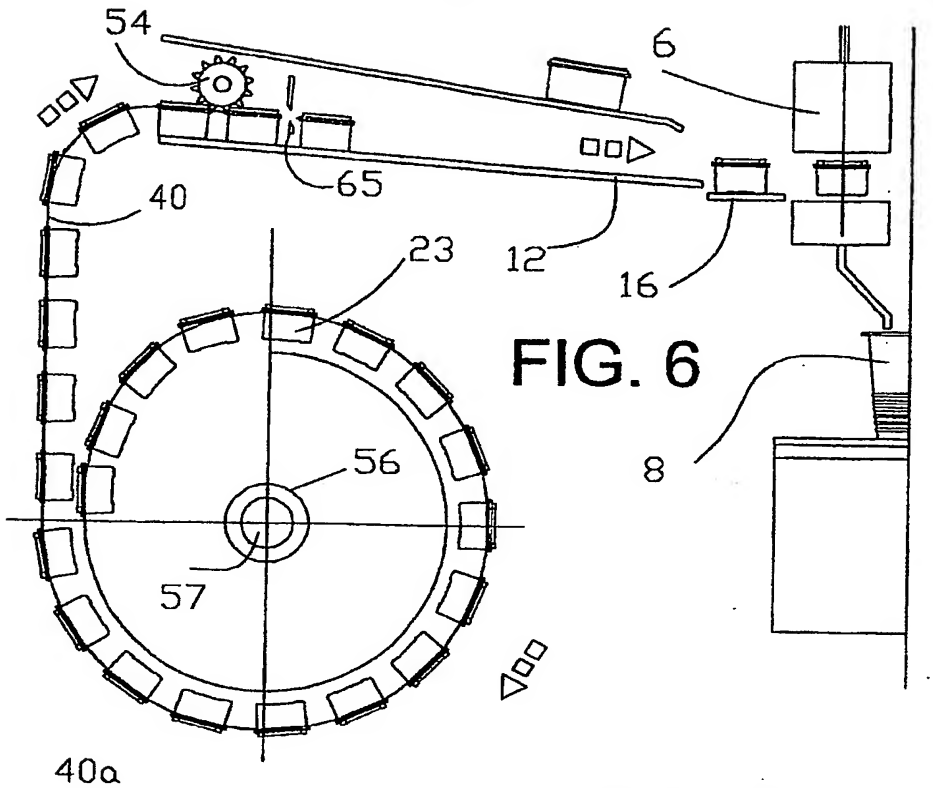


FIG. 6

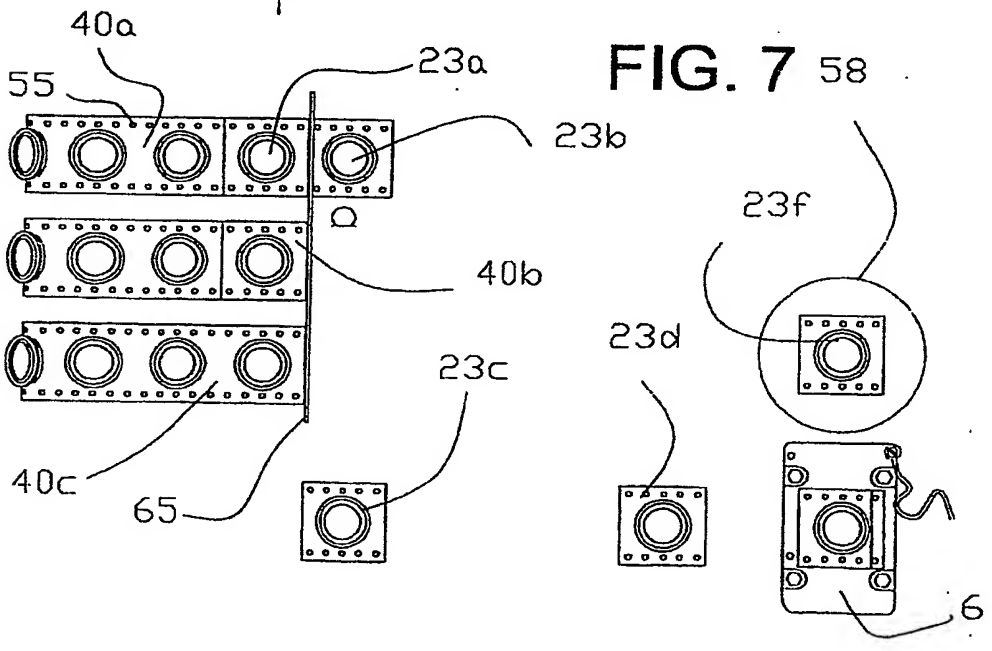


FIG. 7

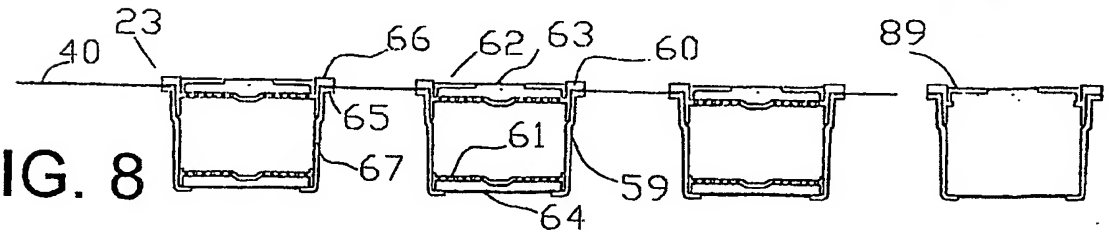
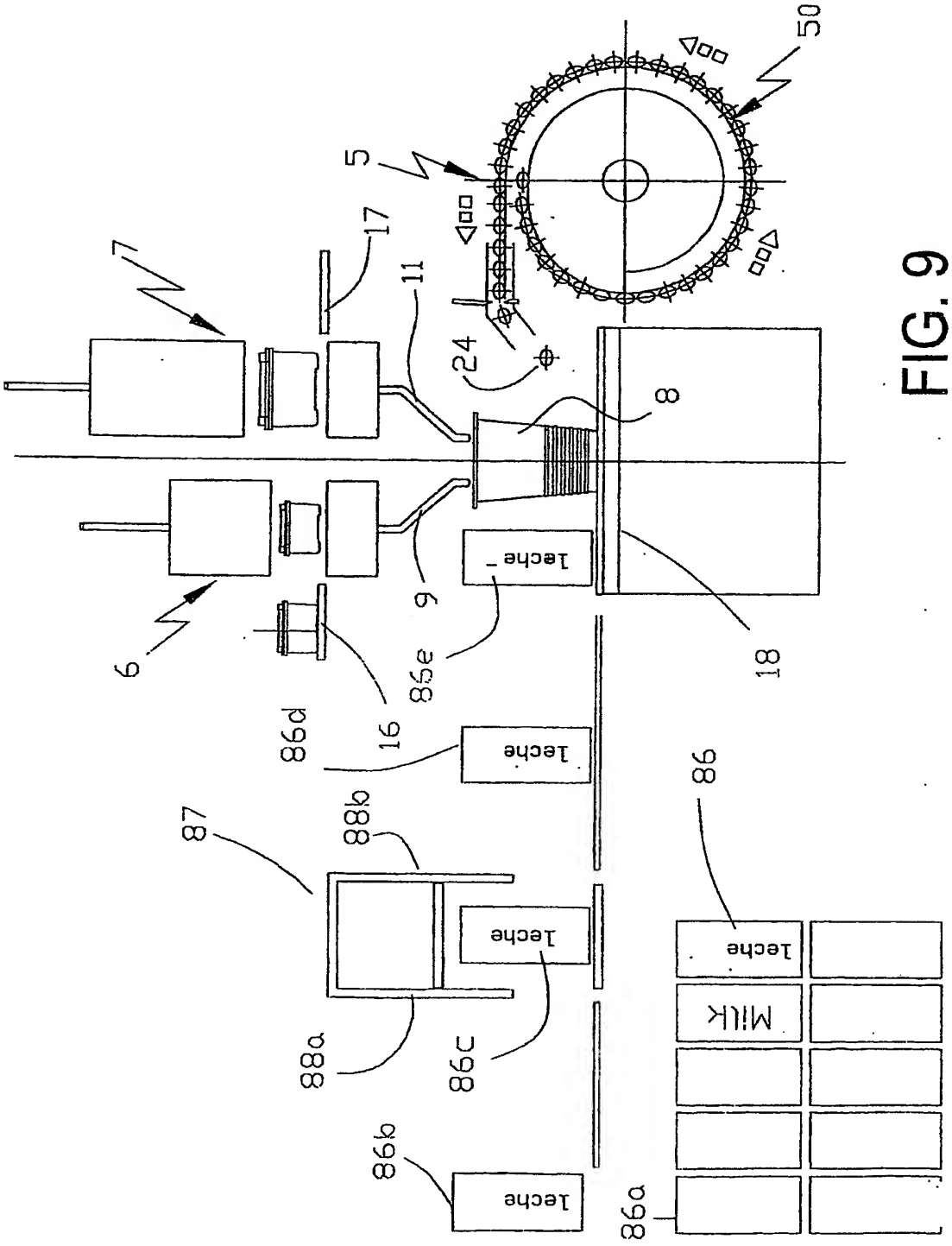


FIG. 8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5
17
7
11
24
8
9
6
85e
18
16
86d
86
87
88b
88a
86c
86b
86a
lache
MILK

FIG. 9

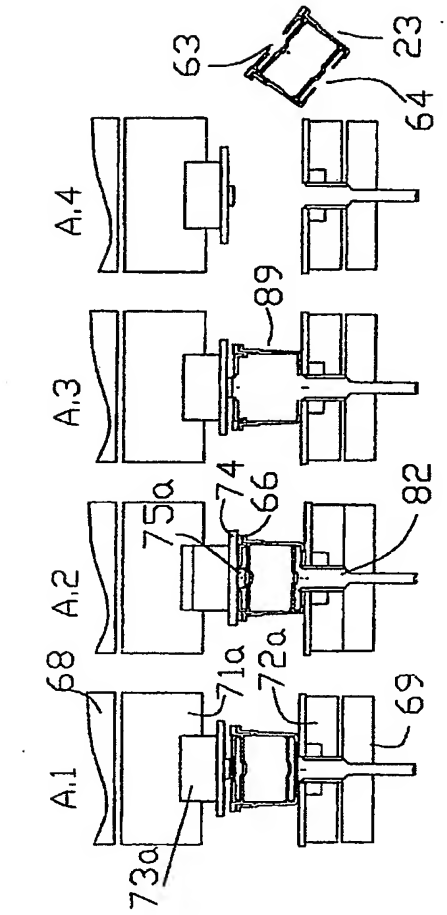


FIG. 11

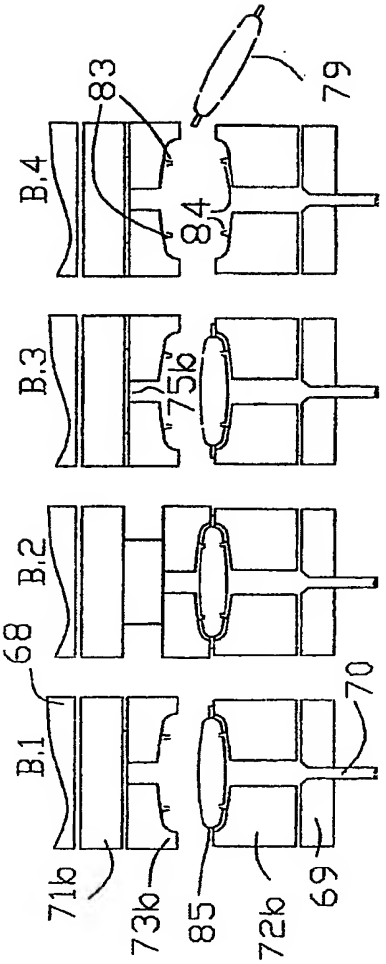


FIG. 12

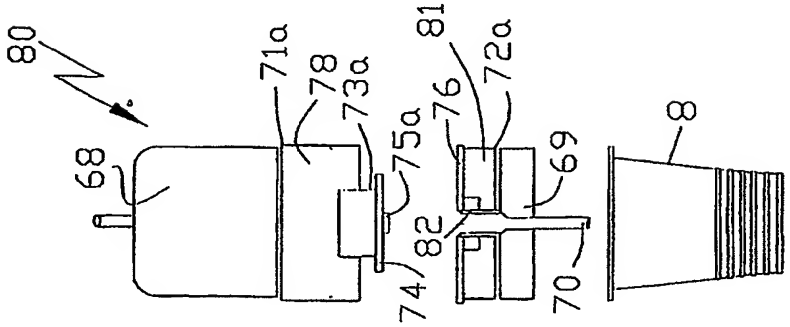
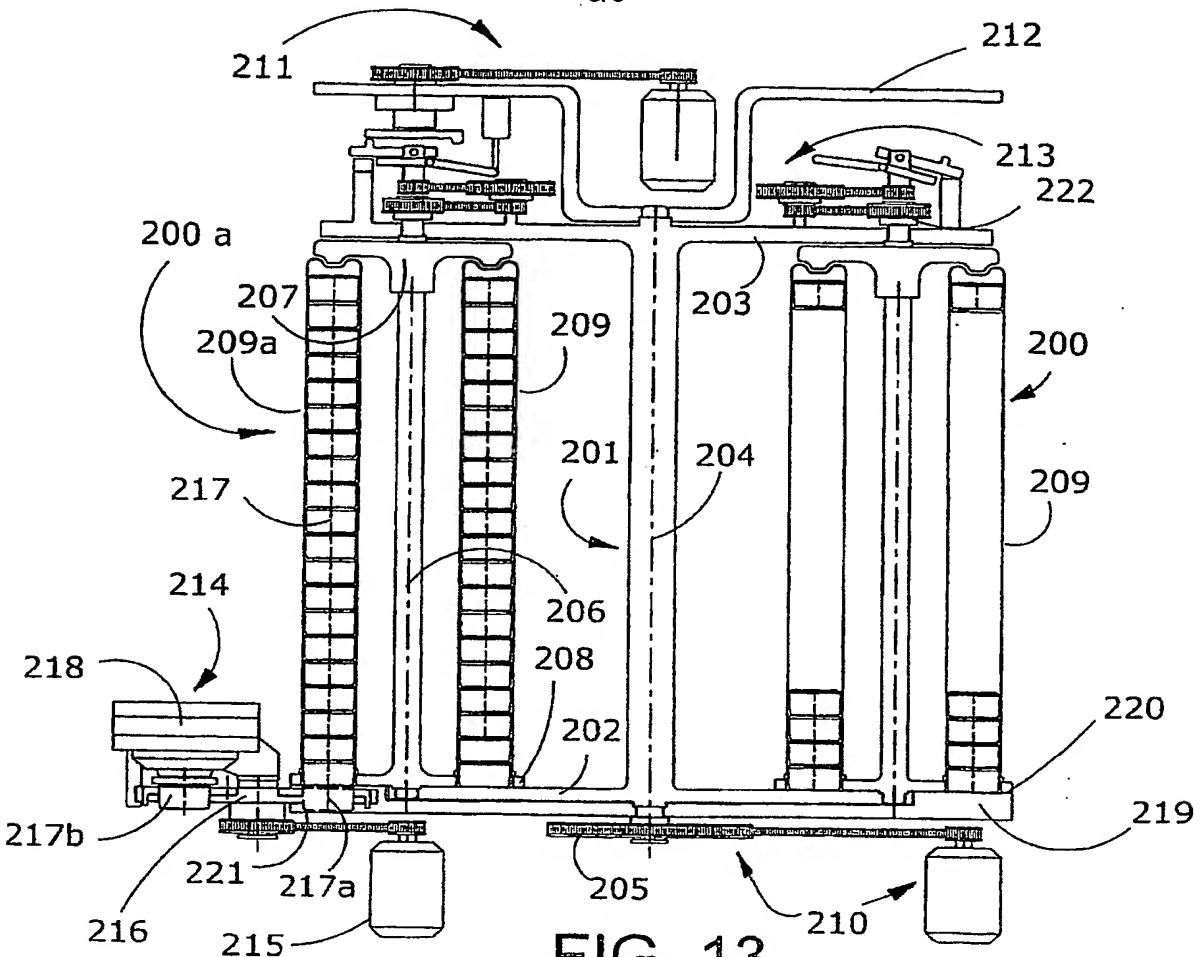


FIG. 10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217b
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217a
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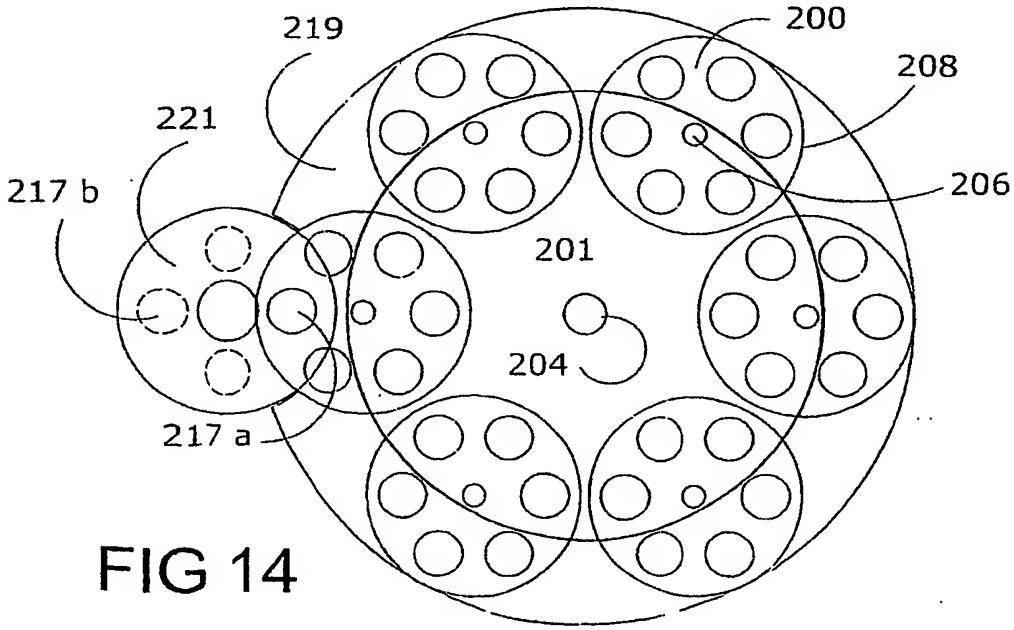
FIG. 13


219
200
208
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217 b
206
201
204
217 a

FIG 14